

**STUDIES ON THE
ALPHA SYSTEMATICS OF THE
MANTID FAUNA (INSECTA:MANTOIDEA)
OF KERALA STATE**

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CERTIFICATE


This is to certify that this thesis is an authentic record of the work carried out by Smt. VYJAYANDI. M.C., from January 1999 to March 2002 under my guidance and supervision in partial fulfilment of the requirements of the Degree of Doctor of Philosophy in Zoology, under the Faculty of Science of the University of Calicut. No part of the thesis has been presented before for any other degree.

It is further certified that the candidate has passed the M.Phil examination of the University of Calicut held in 1988.

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DECLARATION

I do hereby declare that this thesis is an authentic record of the work carried out by me under the supervision of Professor T. C. Narendran, Department of Zoology, University of Calicut and no part of this has previously formed the basis for the award of any degree or diploma as stipulated in the statutes of Calicut University.


Vyjayandi. M. C

*Dedicated
to the loving memory of
my father*

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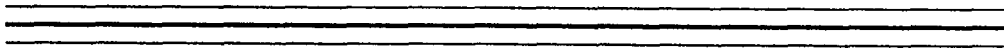
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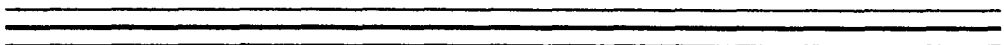
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INTRODUCTION

Vyjayandi. M.C “Studies on the alpha systematics of the mantid fauna (insecta:mantoidea) of Kerala state” Thesis. Department of Zoology, University of Calicut, 2002



Introduction



INTRODUCTION

Kerala, an undulating narrow strip of land sandwiched between Arabian Sea and Western Ghats has developed diversified type of ecosystems with unique assemblage of biological communities. Biological diversity of a region constitutes a range of layers such as intraspecific genetic diversity, diversity of species, their interactions and diversity of ecosystems.

The very long period of uninterrupted geographical stability of this part (of India), its position in the Gondwana Land and its current position so close to the equator, all have contributed its rich luxuriant vegetation and genetic diversity (Nair,1991). Perhaps no other state in India with similar geographic and physiographic conditions has been so blessed with its natural resources than Kerala.

Despite of such high richness in diversity, no exhaustive study on the complete spectrum of biota has been undertaken. Therefore the productive potentials of such invaluable but imperfectly known biota remain unexploited or underexploited. This study of Mantodea of Kerala is such an underexploited field.

Praying mantids are very remarkable group of raptoria or snatchers. The name is a very appropriate one since it comes from the habit of holding the front legs up in a "praying" attitude while waiting for the pray, Because of this habit they are also known as "Soothsayers" or "Holy" or "Wiseman". They are carnivorous in their habits

and feed almost wholly upon insects, which may include most of pests from butterflies, moths, cockroaches to aphids. Their triangular head with its large compound eyes and chewing mouthparts, array of spines on the forelegs swivels freely atop. Their cryptically coloured body enhance their likeness to bark, twigs, leaves or flowers. To sum up these superiorly designed ambush predators, with particular habits of prey capture, camouflage and reproductive behaviour, play a vital role in the natural control of insect pests.

Occurrence of mantids relate back to Paleocene (ROY, 1996). Formerly they were grouped under the order Dictyoptera. In 1838, BURMEISTER put mantids in separate Order Mantodea (BORROR & DELONG 1954 spelt it as Order Mantoidea & MANI 1973 as Suborder Manteodea) under Superorder Blattopteroidea. Eight families are recognised, of which six occur in India. The Indian families are: Metallyticidae, Amorphoscelidae, Eremiaphilidae, Hymenopodidae, Mantidae and Empusidae (MUKHERJEE & HAZRA 1995).

To categorize and classify mantids, the morphological features of eye, vertex, frontal sclerite, mesosoma, forelegs and wings are taken into consideration. Giglio-Tos (1927) divided the family Mantidae into 32 subfamilies and many heterogeneous species were grouped together. BEIER (1964) attempted toward classification of Mantodea. This has been followed by KALTENBACH (1979, 1982), BALDERSON (1984) and MUKHERJEE & HAZRA (1995).

Behaviour and Biology

Mantids are peculiar group of insects showing fantastic and vivid types of behaviour. They are usually seen among vegetations, on flowers, twigs, grass leaves and even sometimes within home premises. They remain motionless for hours, and only the head rotates about 180 degree to watch any disturbances caused by flying insects which are their only food. Usually they proceed rather slowly towards the prey till they come within comfortable distance. Sometimes sedentary insects like aphids are usually hunted by mantids with short and modified foretibiae (as in subfamily Thespinae). Nymphal stages of mantids usually feed on aphids, which are easily accessible. Species of *Tenodera* wait for hours on nearby flowers or on twigs with stretched forelegs (MUKHERJEE & HAZRA). When prey is within their striking distance, the mantids capture the prey with their raptorial forelegs.

HENRY (1932) narrates his observations concerning the lives of mantids as follows: "It is often very difficult to supply the young ones with insects small and numerous enough for their needs. Ripe plantains are exposed so that when it is full of maggots of *Drosophila*, they are placed in mantid cages, fresh plantain being introduced every few days. This way constant supply of the small flies is forthcoming and the young mantises feed greedily upon them. By this the nymphs indulge less in cannibalism in the presence of abundant fly food. After the third or fourth ecdysis, many species become too large for *drosophilae* and require larger flies and small grasshoppers".

In captivity species of *Dysaules* spent much time crouched along dry twigs or grass stems with face looking downwards and the forelegs flexed and laid close against the prosternum. In this position, they are compact and very hard to distinguish from dry twigs. They are strongly positively phototactic as they massed on to the side of cage nearest to the light.

On the approach of enemy, especially one of their own kind, they would rear up the fore part of the body and curve the abdomen upwards, at the same time extending the raptorial legs laterally and displaying the "scare marks" on the prosternum and forecoxae. The tegmina and wings are also raised and displayed to threaten or warn the intruder. Even young nymph adopts this attitude.

Cheddikulama straminea Henry behaves peculiarly, according to HENRY (1932), "On several occasions when disturbed, it was seen to stiffen itself with its ambulatory legs laid along the body, and allow itself to drop to the ground where it would lie shamming death for a long time. In this position of course, the straw like camouflage reached its maximum effectiveness."

WOOD-MASON (1882) in his paper on new and little known Mantodea described the stridulating mantid of Africa viz *Idolomorpha capensis* Burmeister and stated "sounds emitted by them were as loud as, but more crepitating in character than the hiss of a large snake". He described the presence of stridulatory apparatus in *Hierodula (Sphodromantis) bicarinata*. The front edge of the tegmina is strongly

toothed to rub against the apical half of the upper or posterior faces of each of the posterior femora.

Copulation of mantids is accomplished in several steps and they are visually controlled. The eyes are large to spot the partner. After copulation the female devour the male.

Mechanism of formation of ootheca

The gravid females by repeated tapping of cerci find out a suitable place to lay the eggs in cluster within the cocoon like chamber, the ootheca. The secretion from the accessory gland of first abdominal segment, a frothy mass, on contact with air harden to form ootheca. To fix ootheca on any suitable substratum, an yellowish base is produced first. Then the secretion from the accessory glands oozes out through the pore near the cerci and the gonapophyses make it spongy. The terminal abdominal segments move rapidly and air is pumped into the material from the eighth pair of spiracles. Each egg is pushed into the individual compartments, which are obliquely placed. The entire ootheca is constructed within 2.5 to 3 hours. As the ootheca hardens, the colour changes from whitish yellow to dirty brown.

Various Hymenopteran hyperparasites lays their eggs in mantoidean ootheca. For example, members of the genus *Podagrion* Spinola (Hymenoptera: Torymidae) is parasitic on the ootheca of mantids.

Structure of ootheca

A typical ootheca possesses 10 transverse and 18 to 20 longitudinal rows. The horizontal sections show that five egg cells in one transverse half row open into a common vestibule, those of the corresponding half row on the other side opening into the next vestibule. (HENRY 1932). The egg cells may vary from 6 to 300 depending on the size of the species. The ootheca of *Gonypetyllis semuncialis* Wood-Mason, (the smallest known mantid) contains 6 eggs and that of *Tenodera aridifolia* Stal seem to have 300 eggs.

Mantids can be identified from the shape and size of ootheca. The ootheca of *Hierodula* is globular and attached to the twig; bulged and shield-like in *Mantis* Linnaeus, *Empusa* Illiger and *Blepharopsis* Rehn; spindle shaped in *Gongylus* Thunberg; elongated and pyramidal in *Creobroter* Audinet-Serville, *Euantissa* Giglio-Tos and *Statilia* Stal.

The average time for development of *Statilia nemoralis* Saussure is 83 days and the incubation period is 16 days. There are 7 instars, the last one being the longest, about 25 days. (MUKHERJEE & HAZRA 1995).

Ecology and distribution

Mantids are commonly distributed at the warm and moist regions of the world, especially tropical rain forests and are rare at the temperate zone.

In India they are common in North eastern region and are less common at Eastern and Western Ghats. A few species are present at the semi arid and arid zones also.

Locality records shows that *Hierodula* Burmeister, *Elmantis* Giglio-Tos, *Mantis* Linnaeus, *Statilia* Stal, *Amantis* Giglio-Tos, *Euantissa* Giglio-Tos, *Humbertiella* Saussure etc are widely distributed in India. *Amorphoscelis* Stal, *Humbertiella* Saussure, *Tenodera* Burmeister etc are bark dwellers. *Nemotha* Wood-Mason, *Eomantis* Giglio-Tos, *Eumantis* Giglio-Tos etc are restricted to hilly regions of Assam. The species of *Eremiaphila* Lefebvre are present at the semi-arid regions. The monotypic species of *Schizocephala* Audinet-Serville prefer grass meadows and adjoining fields and bushes. *Mantis* Linnaeus, *Statilia* Stal, *Creoboter* Audinet-Serville etc prefer dense shrubs in plains and hills.

The life histories of mantids are modulated according to the climatic conditions of a particular area. Most of the species from Tamil Nadu and Kerala emerge during May-June. Species from Madhya Pradesh hatch in winter (December-January), while in Eastern Ghats and North Eastern region, the hatching occurs during Monsoon (late May to June). Mantids are seen in high altitudes also, upto 1400 metres.

Usually mantids are active during morning and cooler periods in the afternoon. Species inhabiting in semi-arid regions are active soon after sunset to avoid desiccation. They are positively phototropic. No strict nocturnal species are noticed.

As they target only the moving preys, the scarcity of food may lead to cannibalism, which causes decline in population.

Geographical distribution

The Oriental region shows habitat diversity and faunal diversity of mantids closer to the Ethiopian and the Australian region rather than Neotropical or Holarctic regions.

The endemic families and subfamilies of Mantodea occurring in the Oriental region are: Metallyticidae, Schizocephalinae, Phyllothelinae and Parathespiinae. Some endemic genera belonging to Hymenopodidae, Amelinae, Iridopteryginae, Toxoderinae are also known from Oriental region.

Fourteen subfamilies of mantids are common to Oriental and Ethiopian regions. These are: Oxythespiinae, Iridopteryginae, Amelinae, Tarachodinae, Liturgusinae, Caliridinae, Thespiinae, Acromantinae, Hymenopodinae, Toxoderinae, Empusinae, Blepharodinae, Deroplatinae and Eremiaphilinae.

Six subfamilies of mantids are common to the Oriental and Neotropical region viz. Acromantinae, Amorphoscelinae, Hymenopodinae, Choeradodinae, Liturgusinae and Thespiinae.

Four subfamilies occur both in Oriental and Palaeartic region viz. Oxythespinae, Iridiopteryginae, Amelinae and Empusinae. Only two subfamilies are present in Oriental and Nearctic regions together, Amelinae and Thespinae. Iridiopteryginae and Toxoderinae are common to Australian and Oriental regions. The Sri Lankan region is comparatively richer in endemism than Indian subregion. (MUKHERJEE 1995).

Scope and importance of the Present Study

Mantids play both positive and negative roles in the ecosystem. They are predators of insects which include both beneficial and harmful ones. However the beneficial aspects as predators of several insect pests far outweigh their harmful effects as destroyers of beneficial or non injurious insects. Hence the study of mantids is economically very important. Unfortunately the fauna of Mantodea is very poorly known from India especially from Kerala where losses suffered due to damages by insect pests are often enormous. Hence the present investigation is under taken with a view to find out what genera and species of Mantodea are present in Kerala and to work out the taxonomy of these interesting group of insects at alpha level.

Any research programme in Biological science cannot take off successfully unless the taxonomy of the species or group of species involved is properly understood; be it the study of fauna or animal diversity, their distribution and inter relationship or any matter related to ecology including biology, behaviour,

developmental biology, genetics, pest management or exploitation and conservation of biological resources.

REVIEW OF LITERATURE

Vyjayandi. M.C “Studies on the alpha systematics of the mantid fauna (insecta:mantoidea) of Kerala state” Thesis. Department of Zoology, University of Calicut, 2002

10A

Chapter I

Review of Literature

REVIEW OF LITERATURE

The study of systematics of Mantidae owe back to mid eighteenth century when LINNEAUS(1758) described *Grillus religiosa* and *Grillus bicornis* in *Systema Naturae*. LINNEAUS was followed by FABRICIUS (1779) in *Systema entomologiae*. He described the classes , orders, genera and species of insects and also *Mantis cancellata* and *Mantis urbana*. In 1781, he reported *Mantis superstiosa*. THUNBERG(1784) described *Mantis maculata*. In 1792, OLIVIER in his work 'Encyclopedia of Natural History of Crustaceans, Arachnids and Insects' described *Mantis coronata*. STOLL in 1813 described *Mantis gemmata* and *Tenodera aridifolia*. In 1815 THUNBERG erected a new genus *Gongylus* based on the type species *Gongylus gongylodes* (Linnaeus). In this paper he also described *Mantis fuliginosa*. LEACH(1818) published a paper on Systematics and Biology of Order Mantodea.

AUDINET-SERVILLE in 1831 in his publication on Mantidae erected a new genus *Schizocephala* of family Schizocephalinae. In this paper he also erected two other genera viz. *Choeradodis* and *Thespis*. WESTWOOD (1835), based on the type species *Metalliticus splendidus*, erected a new genus, *Metalliticus* from Malabar coast of Kerala (India). LEFEBVRE in 1835 publised a major work on Mantodea in which he added a new genus *Eremiaphila*.

It was BURMEISTER (1838) who placed mantids in a separate order Mantodea. In the same year he erected three new genera viz. *Hierodula*, *Polyspilota* and *Tenodera*. He also reported a new species *Empusa trachelophylla*. In 1843

WESTWOOD contributed to the taxonomy of Mantodea with descriptions and illustrations of syntype *Phyllocrania insignis*. BLACHARD in 1853 designated the syntypes viz. *Mantis costalis* and *Mantis fusca*. In 1854 FISCHER reported on some European mantids. WALKER(1859) in his paper 'Characters of some apparently undescribed Ceylon insects of order Orthoptera' described the species *Harpax signifer*.

Contributions of SAUSSURE in the field of taxonomy of mantids were during the years 1869, 1870, 1871 and 1873. In 1869 he erected a new genus *Humbertiella* with two new species viz. *H. ceylonica* and *H. indica*. In the following year (1870) a new genus *Acromantis* is added to the taxonomy of mantids by the same author. *Miopteryxa lacteal* is another new species included in his work in the same year. In 1871, SAUSSURE described *Iris (Fisheria) brunneri* and *Phasmomantis infusate*. In the same year in another paper, he erected a new genus *Hestiasula* with type species *H. brunneriana*.

A mantis without the typical mantalian array of tibial spines viz. *Amorphoscelis annulicornis* was described by STAL in 1871. Based on this type species the same author erected a new genus *Amorphoscelis*. Another new genus *Phthersigena* with type species *P. conspersa* was erected by the same author in another paper in the same year. In 1873 SAUSSURE published a paper on mantids.

In 1876 WOOD-MASON published a paper on mantids with description of a new species viz. *Fisheria laticeps* from Bangalore (India). BOLIVER (1876) prepared a synopsis on Family Mantidae. STAL in 1877 published 'Systema mantoderum', in which he described a monotypic new species *Ambivia popa* from Eastern India. In this paper he also erected new genera viz. *Deiphobe*, *Statilia*, *Spodropoda* and *Blobe*. He described a new species *Tenodera platycephalus* from India in the same paper.

In 1877 WOOD-MASON erected three new genera viz. *Didymocorypha*, *Paradanuria* and *Aethalochroa*. In 1878 he described various species of *Hierodula* Burmeister from India including *H. fraticida* from Malabar. WOOD-MASON (1879) described *Sigerpes occidentalis* from West Africa. In 1882 he commented on subfamilies Amorphoscelidae, Eremiaphilidae and Mantidae. He redescribed *Eremiaphila arabica* Saussure and described new species viz. *Tarachodes insidiator*, *Tarachodes dissimulator*, *Iris orientalis*, *Gonypeta autemon*, *Hierodula (Sphodromantis) muta*, *Mesopteryx robusta*, *Polyspilota insignis* and *Mantis callifera* in this paper.

In 1882 PASCOE made descriptions of a new species of mantid viz. *Callimantis eximia* from Brazil. PREUDHOMME (1883) prepared a list of mantids of Royal History Natural Museum of Belgium. WOOD-MASON in 1884 erected a new genus *Nemotha* with type species *Nemotha metallica* (Westwood). In the same year he published a paper entitled '*Phyllothelys*, a remarkable genus of Mantodea from

Oriental region'. In this paper he described two new species of *Phyllothelys*, viz. *P. westwoodi* and *P. paradoxum*.

In 1889 WOOD-MASON described some Ethiopian and Oriental representatives of Mantodea viz. *Toxoderopsis spinigera*, a new species of a new genus. In the same year he reported two other new species of *Phyllothelys* viz. *P. taprobanae* from Burma and *P. malayae* from Malayan Peninsula.

WESTWOOD (1889) in his Revision of family Mantidae described many new species viz. *Paradanuria parvula*, *Euthyphleps curtipes*, *Hierodula patellifera*, *H. bipapilla*, *Phasmomantis brunneri*, *Mitopteryx irridipennis* etc.

In his catalogue of Mantodea, WOOD-MASON (1889) divided family Mantodea Burmeister into Grade A Promantodea Wood-Mason and Grade B Eumantodea Wood-Mason. Under Promantodea he included subfamily Amorphoscelidae Stal with four genera viz. *Paroxypilus* Saussure and Stal, *Discothera* Bonnet and Finot, *Amorphoscelis* Stal and *Compsothespis* Saussure. In Grade B Eumantodea he included subfamily. Eremiaphilidae Stal with 18 genera viz. *Metallytica* Westwood, *Arria* Stal, *Chaeteessa* Burmeister, *Choeradodis* Serville, *Orthodera* Burmeister, *Eremiaphila* Lefebvre, *Dysaules* Stal, *Schizocephala* Serville etc.

WOOD-MASON in 1890 published a paper on new genus *Parymenopus* with type species *Parymenopus davisoni* from Oriental Region. In the same year, he

published another paper on a new genus *Triaenocorypha* with type species *Triaenocorypha dohertii*.

WOOD-MASON published the second part of the catalogue of Mantodea in 1891 which was a continuation of the first catalogue. Genera coming under Grade B Eumantodea of the subfamily Mantidae viz. Genera *Sibylla* Stal, *Oxypilus* Serville, *Ceratomantis* Wood-Mason, *Pachymantis* Saussure, *Triaenocorypha* Wood-Mason, *Theopompa* Stal etc. were included. The catalogue is an enumeration of the specimens in the collection of the Indian Museum, Calcutta.

In 1892, BRUNNER described a new species *Mantis nobilis* and also recorded *Gonypeta irina* and *Iridopteryx reticulata*. SAUSSURE published a paper on the same mantids from Central America in the same year. SAUSSURE and ZEHNTER (1893) described many syntypes viz. *Mionyx saevus*, *Stagomantis venusta*, *Acontistia westwoodi*, *A. quadrimaculata* from Panama, Guatemala and Brazil respectively. The same authors in 1895 published paper on mantids of Madagascar region.

BOLIVER (1897) studied various Orthopterans of Thiruchirapally(India) including mantids of the genera *Humbertiella* Saussure, *Iridopteryx* Saussure, *Gonypeta* Saussure, *Tropidomantis* Stal, *Statilia* Stal, *Tenodera* Burmeister, *Hierodula*

Burmeister, *Mantis* Linnaeus, *Parathespis* Saussure, *Schizocephala* Audinet-Serville, *Antissa* Saussure, *Creobroter* Audinet-Serville and *Gongylus* Thunberg.

In 1899, KIRBY published a paper on various syntypes of mantids from South Africa viz. *Acanthomantis rendalli* and *Solygia distanti*. KIRBY in 1900 prepared a monograph on the flora and fauna of Christmas Islands in which he dealt with the syntype *Hierodula dispar*. KRAUSS in 1902 described a new species viz. *Empusa spinosa*. SHELFORD in 1903 made biological notes on some Bornean Mantidae.

In the study of Old World Mantidae REHN (1903) described the entire collection of mantids of the Academy of Natural Sciences of Philadelphia and the United States National Museum. KIRBY (1903) reported a new species of mantid from Malaysia viz. *Deroplatys shelfordi*. In 1904 REHN gave an account of mantids and sooth sayers in general. In 1904 KIRBY made notes on Mantidae in the collection of British Museum (Natural History) in which he included a new type *Sphendale robusta* from Nepal. In the same year KIRBY published the "Synonymic Catalogue" in which he stated that there were seventy eight nominal species of Mantodae represented by holo types or syntypes in the British Museum(Natural History). TEPPER (1904) reported from Southern Australia a new species of mantid *Pseudomantis pulchella*. In 1905 the same author described *Archimantis quinquelobeta*, a new species from South Australia.

A thorough observation of world mantids were done by GIGLIO-TOS in the years 1907, 1911, 1912, 1913, 1914, 1915 a, 1915b, 1915c, 1916, 1917a, 1917b, 1919, and the consolidated work was published in 1927.

In 1907 GIGLIO-TOS published a paper on African mantids. In 1909, SJOSTEDT reported two syntypes, *Miomantis kilimandjarica* and *Miomantis planivertex* from Tanzania. GIGLIO-TOS (1911) described some new species of *Polyspilota* Burmeister viz. *P. seychelliana*, *P. magna*, and *P. caffra*. In the same paper he also erected a new genus *Plistospilota*.

WERNER published papers on the taxonomy of Manodea in 1911, 1912, 1922, 1923, 1926, 1927, 1928, 1930, 1931, 1933, and 1935. In 1911 WERNER published a paper viz. a syntype of *Hierodula dimorpha*. In 1912 the same author reported on a syntype *Pseudomantis lartmeyeri* from Australian. GIGLIO-TOS in 1912 added notes on *Tenodera* Burmeister, *Hierodula* Burmeister and *Rhombodera* Burmeister. Two new species, viz. *Hierodula (Hierodula) ventralis* from India and *Tenodera blanchardi* from New Guinea were also included in this paper. In 1913 GIGLIO-TOS discussed on Subfamily Perilamantidae and erected a new genus *Metoxypilus* with type species *M. spinosus*. In 1914 the same author published two papers on mantids. First one was on further notes on Subfamily Perilamantinae. The second publication was a revision of Subfamily Toxoderini of equatorial region of Africa. In this paper he erected a new genus *Toxoderella* with type species *Toxodera (Paradanuria) fortnumi* Westwood. In 1915 GIGLIO-TOS wrote on Acromantinae and

described two new species *A. insularis* and *A. Montana* from Java. In the same year GIGLIO-TOS reported two new genera viz. *Eomantis* and *Ormomantis* with type species *Eomantis gutatipennis* (Stal) and a new type species *Ormomantis indica*. Another piece of work done by the same author in the same year was the erection of two new genera *Amantis* and *Cimantis* from India based on the type species *Amantis reticulata* Haan and new species *Cimantis fumosa*. He also recorded *A. biroi*, *A. bolivarii*, *A. subirina* and described *A. indica*. In 1916 GIGLIO-TOS erected a new genus *Deiphobella* with type species *D. laticeps* (Wood-Mason). He also reported *Deiphobe indica* in the same paper. In 1917 GIGLIO-TOS reported the syntypes of *Archimantis minor* from western Australia. In the same year he prepared notes on the catalogue of mantid by Kirby (1904).

SJOSTEDT (1918) published on mantids of Australia. In this paper he described the new species viz. *Gyromantis occidentalis*, *Paraoxypilus flavifemur*, *Truxomantis kimberleyensis*, *Austrovates variegata* and erected a new genus *Austrovates*. GIGLIO-TOS in 1919 erected two new subfamilies of Mantidae viz. Thespinae and Iridopteryginae. HEBBARD (1920) made studies of Malayan, Papuan and Australian mantids. In the same paper he reported a new genus *Kongobatha* with type species *K. diademata*. CHOPARD in 1921 reported on mantids of Mesopotamia and Persia. He acknowledged the presence of *Empusa uvarovi* Chopard from Mesopotamia (Iraq).

UVAROV published his work on the taxonomy of mantids during the year 1921, 1922, 1923, 1924, 1927, 1929, 1930, 1931, 1933, 1935, 1936, 1939 and 1948. In 1921 UVAROV described *Eremiaphilia fraseri* from Mesopotamia. In the same year KARNY based his classification of mantids on the basis of wing venation and divided Mantodea into 8 families. WERNER in 1922 reported *Heterarchimantis lobata*, a new species from Australia. In the same year UVAROV in his paper 'Records and descriptions of Orthoptera of South West Asia' described new species viz. *Eremiaphila laevifrons*, *Tarachodes arabicus*, *Fischeria inermis*, *Iris persa* and *Iris splendida*. UVAROV (1923) from North West Africa reported a new species, *Iris deserti*. TINDALE (1923) reported on Mantidae of Australian Museum including the syntypes of *Cliomantis dispar*. Based on the type species *Notomantis chlorophana* and *Nullabora flavoguttata* he erected two new genera viz. *Notomantis* and *Nullabora* respectively. In the same paper he described two new species viz. *Bolbe mala* and *B. pallida*.

In 1923 WERNER grouped four species in a new sub genus *Tamolanica* but did not designate the type species. CHOPARD in 1924 made a study of the new species *Hierodula (Hierodula) doveri* from India. UVAROV (1924) published a new mantis from Cairo. viz. *Sinaella nebulosa*. TINDALE in 1924 made a review of Australian mantids in which he erected a new genus *Ima* with type species *Ima fusca* from Queensland. He also described *Neomantis hyalina* in this paper. HANDLIRSCH (1925) recorded a new Subfamily Compsothespinae in which he treated the genus *Compsotherpis* Saussure 1873 and species *C. australiensis* Wood Mason 1889. In

1926 WERNER reported on mantids. GIGLIO-TOS in 1927 made an elaborate study of world mantid fauna in 'Das Tierreich'. In this work he divided the Family Mantidae into 32 subfamilies and 380 genera. WERNER described a new species *Archimantis inermis* in 1927. In the same year, UVAROV reported from Ceylon two new species of mantids viz. *Compsomantis ceylonica* and *Pezomantis hearyi*. In 1927 UVAROV also studied a mantid from Burma viz. *Paratoxodera meggeitti*. WERNER (1928) reported on a new genus *Greothespis* from New Guinea and no type species was designated. STRAGER in 1928 redescribed *Mantis religiosa* Linnaeus. UVAROV (1929) described *Eremiaphila rufipennis* from Sinai.

BEIER contributed to the field of Taxonomy of mantids during the years 1929, 1930, 1931, 1932, 1937, 1941, 1963, 1964 and 1968. In 1929 he published a paper on a new species of mantids viz. *Creobroter elongata* from Sikkim (India). UVAROV in 1930 added to Mantodea literature *Iris nana* and *Amelis morocana*. BEIER in the same year reported a new species *Sphaeromantis spinicollis* and *Dorymantis somalica* from Somalia. He erected a new genus *Haldwania* in the same year with the type species *H. liliputana*. Another new species he noticed in the same year was *Nilomantis arabica* from Saudi Arabia. In this paper he also described the following new species present in the British Museum viz. *Gonypetella uvarovi*, *Holocorypha ugandana*, *H. turneri*, *H. striata*, *Uvaromantis tristis*, *Gonypeta simplex*, *Miomantis natalica*, *Amantis longipennis* and *Eremiaphila gigas*. These specimens belong to Africa, Sri Lanka and Vietnam. This paper also included a new Indian species *Plistospilota nova*.

TINDALE (1930) published a paper on Mantidae in the Australian Museum in which he described the type species *Rawarena paraoxypila*. In the same year WERNER studied mantid fauna of Forest Research Institute Dehra Dun (India) viz. *Eomantis guttatipennis* Stal, *Leptomantis indica* Giglio-Tos, *Mantis nobilis* Brunner, *Aethalochroa ashmoliana* (Westwood), *Hestiasula brunneriana* Saussure and described *Hestiasula nigrofemorata*, *Mantis inornata* as new species. In 1930 SJOSTEDT reported two new species from India. They are *Deiphobe brevipennis* and *Humbertiella nigrospinosa*. In the same year HANDLIRISCH published a paper on Order Mantodea.

Many papers on mantids were published during the year 1931. LAIDLAW (1931) described a new mantid from Bihar viz. *Rombodera doriana*. In 1931 BEIER in the same year published a paper based on the Mantodea collections of Zoological Museum, Hamburg. Again BEIER (1931) reported three new species of Mantidae and erected a new genus viz. *Pararivetina* with the type species *P. fraseri*. The other two new species are *Amorphoscellis ugandensis* and *Polyspilota montana*. In the same year UVAROV made notes on genus *Iris* Saussure. In this paper he noted two new species of *Iris* viz. *Iris radians* from Pakistan and *Iris oratoria coeca* from Sudan. In 1931 UVAROV published another paper on a new mantid from Baluchistan, *Microthespis evansi*.

WERNER (1931) in his paper entitled "Further Notes on Indian Mantids or Praying insects" studied the following mantidae viz. *Amorphoscelis indica* Giglio-Tos, *Humbertiella ceylonica* Saussure *Dysaules himalayanus* Wood Mason and *Haldwania lilliputana* Beier. In this paper he also described new species viz. *Cimantis testacea*, *Cimantis fuliginosa*, *Memantis minor*, *Memantis gardneri*, *Hierodula (Rhombodera) woodmasoni*. He also arranged a syntype table of subgenus *Rhombodera* in accordance with the table of 'Das Tierreich' (Giglio-Tos 1927) in the same paper. A new genus *Oxymantis* was also erected by WERNER in this paper. HENRY (1931) reported some new Ceylonese mantids including *Muscimantis montanus*.

In 1932 HENRY wrote on some interesting characteristics of certain mantids indicating its nature of camouflage. He observed these peculiarities while rearing a new species of mantid *Cheddikulama straminea*, the monotype of the new genus *Cheddikulama*. In the same paper he described another three new species viz. *Dysaules uvana*, *Hierodula versicolor* and *Oxyophthalma gracilis* Saussure. BEIER in 1932 gave an account of some new Malayan mantids from high altitudes (3300-4800 ft high). They are *Theopropus elegans rubrobrunneus*, *Camelomantis parva*, *Psychomantis malayensis* and *Xanthomantis malayana*.

In 1933 WERNER contributed to the knowledge of Indian mantids by describing a new species *Leptomantis parva* from Dehra Dun (India). BODENHEIMER (1933) published a paper on a new species of desert dwelling mantid viz. *Eremiaphila uvarovi* from Jordan. In 1933 UVAROV in his first publication

on mantid reported a new species *Eremiaphila ammonita* from Amman (Jordan). In another paper in the same year, the same author published a new species from South East Arabia viz. *Sphrodromantis dhufarica*.

BEIER published three papers on mantids in 1934. In the first and second paper he dealt with subfamilies Hymenopodinae and Empusinae of family Mantidae and in the third paper he commented on subfamily Toxoderinae. In 1935 the same author published on subfamilies Thespinae, Orthododerinae, Choeradodinae, Deroplalinae and Mantinae of family Mantidae. WERNER (1935) published his consignments on a remarkable group of mantids Rivetininae description of a new species *Deiphobella gardener*. In this paper he also erected two new genera viz. *Indothespis* and *Beesoniella* with type species *Indothespis assamensis* and *Beesoniella pallida*, the latter species was from Nilambur, Kerala, India. In this paper he also commented on *Dysaules himalayunsus* Wood-Mason, *Gonypeta punctata* (Haan), *Statilia maculata* Thunberg, *Mantis religiosa* Linnaeus, *Hierodula ventralis* Giglio-Tos, *Tenodera fasciata* Oliver. The study was made on the basis of mantid specimens at Forest Research Institute, Dehra Dun, India.

In 1935 UVAROV reported a new species of mantid *Tenodera rungsi* from Morocco. In the same year the same author in a different paper recorded *Oreomantis steelae* from Mount Cameroon (West Africa). UVAROV in 1936 published two papers on mantidae, first was the study of Arabian mantids including the new species *Altalia philbyi*. In the second paper he reported *Ameles cypria*, a new species from Cyprus.

BEIER in 1937 published two papers on mantids. In the first paper he reported a new species *Oxyothespis parva* from Lake Rudolf Rift Valley (Uganda) and in the second paper a new species *Amorphoscelis micans* was reported from Malaysia.

UVAROV in 1939 made a study of Arabian mantids. He reported a new species *Sinaiella sabulosa* in this paper. In the same year the same author also published from Palestine a new species *Xenomantis palmonii*. HINTON (1939) discussed on Australian mantids and described a new species *Cliomantis obscura*. UVAROV in 1940 published a paper on twenty eight generic names of Orthoptera including of Mantodea. BEIER (1941) described some new species of mantids of German Museum viz. *Amorphoscelis spinosa*, *Leptomantis montana*, *Liturgusia atricoxata* and *Hagiomantis pallida*. In 1948 UVAROV redescribed *Mantis brevis* Rambur. CHOPARD (1949) published a paper on mantids in which he erected a new subfamily, Paraoxypilinae Chopard. In 1951 ROONWALL and BHASIN published a systematic catalogue of mantids at the Forest Research Institute, Dehra Dun (India). In the same year GURNEY reported on the praying mantids of United States, both native and introduced-ones. BEIER (1952) published a paper on mantids.

LA GRECA (1952) described new species of Mantodea of Africa and Oriental regions, viz. *Calarmothespis taylori*, *C. subcomuta*, *Oxyophthalmellus rehni*, *Parachodes oxynotus* and *Hypsicorypha guichardi*. In this paper he described a new

species *Galepus coronatus* from Ethiopia. In 1953 HUGHES –SCHRADER made a supplementary notes on cytotaxonomy of mantids. KEVAN (1954) reported Mantodea from northern Kenya and Jubaland with the description of two new species viz. *Blepharodes minor* and *Catasegerpes acuminatus*. In 1955 RAGGE prepared a note on the wing venation of Mantodea. IN 1956 TUXEN published a paper on Taxonomist's glossary on genitalia of insects.

In 1963 BEIER reported a new mantid of family Hymenopodidae from Darjeeling , India. The same author in 1964 in his work proposed classification for order Mantodea. NADKERNY in 1965 made a catalogue of mantids in the collection of Bombay Natural History Society . In this work 28 species of mantids from India and 6 species from the neighbouring areas have been included. In 1965 ROY published a paper on *Amorphoscelis* from the Oriental region . BEIER in 1965 reported a new genus *Nesoxypilus* from Prince of Wales Island ,Queensland, Australia.

ROY (1966) made a revision of the genus *Oxypilus* Audinet - Serville. In the same year ROY published a paper on the taxonomy of Mantodea viz. a new species of *Amorphoscelis* from Oriental region. A third paper by the same author in the same year was about another new specis of *Amorphoscelis* from Iraq. In 1967 RAGGE and ROY made a review of praying mantids of Ghana. In 1968, BEIR published a paper on Mantodea. ROY (1969) described three new species of *Oxypilus tanzanicus* *O. rages*, *O. burri* from Tanzania, Somali and Angola respectively. LA GRECA in 1969 described a new species *Blobe lowi* from Australia.

KEY in 1970 published a text book for students and research workers in which he added notes on Mantodea. PETERSON & GAEDIKE (1970) made a catalogue of mantids. In 1971 LINDT discussed on the mantid fauna of Asia. In his paper ROY (1972) described two new species viz. *Junodia vansomereni* from Kenya and *Junodia maculata* from Zambia. In the same year ROY published another paper on a new species of mantids viz. *Gongoharpax judithae* from Nigeria.

MARSHALL in 1975 published a catalogue of primary types of Mantodea in the British Museum (Natural History). This was an alphabetical catalogue of holotypes, lectotypes (and associated paralectotypes) and syntypes of Mantodea and 278 nominal species are represented by such type materials. Two lectotypes were newly designated. In 1976 HARZ and KALTENBACH published a paper on Mantidae of Europe. In this paper they gave key to families and the subfamilies. LA GRECA (1977) erected a new genus *Riventinula* with type species *Riventinula fraterna* (Saussure). In the same year, KEVAN (1977) prepared a higher classification of Orthoptera. OTTE (1978) made notes on primary types of Orthoptera at the Academy of Natural Science, Philadelphia. In 1979 NISHIDA prepared a catalogue of Mantodea.

KALTENBACH contributed to the taxonomy of mantids during the years 1979, 1980 and 1982. In 1982 KALTENBACH recorded 20 genera of mantids from Arabian Peninsula of which 6 are common in India. He recorded the desert genus

Eremeaphila Lefebvre has been recorded from Western India. *Blepharopsis* Rehn from Rajasthan and *Empusa* Illiger from Andhra Pradesh, Orissa, Uttar Pradesh and Rajasthan. *Iris* Saussure, *Mantis* Linnaeus, *Hierodula* Burmeister were also reported from India. He also described a new species of *Amorphoscelis* Stal from Afghanistan in the same paper. BROWN(1982) in his paper 'Synopsis and classification of Living organisms' wrote about Mantodea. TERRAL in 1982 recorded new genera and new species of mantids from South America. Same year HILL, HORE and THORNTON discussed on some Hongkong mantids. In 1982 VICKERY and KEVAN published a monograph on Orthopteroid insects of Canada and adjacent regions. PERTY(1983) designated some lectotypes and paralectotypes of mantids of Zoological State collection of Munich.

Recently an Indian scientist contributed much to the field of mantid Taxonomy is MUKHERJEE. He published many papers on Mantodea during the years 1983, 1985a, 1985b, 1992 and 1995.

In 1983 MUKHERJEE and HAZRA published a paper on mantids of Maharashtra (India). In this paper they studied *Heterochaetula tricolor* Wood-Mason, *Creobroter apicalis* (Saussure), *Euantissa pulchra* (Fabricius), *Humbertiella ceylonica* Saussure, *Mantis nobilis* Brunner and described a new species *Elmantis nira*.

BALDERSON (1984) did a meticulous job in preparing the Catalogue of Australian Mantodea. This Catalogue covers all the nominal species of Mantodea currently known from the literature to occur in Australia, including Tasmania and

Torres strait Islands. In this paper type localities, sex and other details of types were documented along with present location types. The bibliography with all references containing descriptions of species recorded or described from Australia was also given in this paper.

JANTSCH in 1984 reported a new species *Parastagmatoptera concolor* from Brazil. KALTENBACH in the same year described two new species from Saudi Arabia viz. *Oxythespis apostata* and *Revitina pallida*. In this paper he stated that there were a total of 40 species of Mantodea were known from Saudi Arabia. *Aethalochroa spinipes* Wood-Mason was reported for the first time from Saudi Arabia in this paper. This was also the first South West Asia record of subfamily Toxoderinae. Additional localities of 17 species of Mantodea previously recorded from Oman are also included in this paper.

In 1985 SCHOEMAN prepared notes on mantids of South Africa. MUKHERJEE and HAZRA (1985) published a paper on a new record of desert mantid *Eremiaphila rotundipennis* Kirby from India. In the same year the same authors published two more papers. In the first paper they presented 10 species of Mantodea distributed over 10 genera and two families. The species recorded for the first time from Arunachal Pradesh (North East India) are *Hierodula (Hierodula) sausseri* Kirby, *Statilia nemoralis* (Saussure), *Statilia maculata* Thunberg, *Statilia apicalis* (Saussure) etc. All these specimens belongs to subfamily Mantinae Kirby.

MUKHERGEE and HAZRA in their third paper in 1985 entitled "Some little known and new praying mantids from Mulla Periyar Tiger Reserve" Kerala(India),described a new species *Hapalopeza periyara*. They also recorded ,*Tenodera fasciata* Oliver , *Didymocorypha lanceolata* (Fabricius), *Ephestiasula amoena* Giglio-Tos and *Tenodera bokiana* Giglio-Tos from the same region.

A recent Italian scientist who has been working in Mantodean Taxonomy is LOMBARDO, who published many papers on mantids from 1985 onwards. In 1985 he recorded the presence of genus *Pseudoyersinia* Kirby in Algerea and described three new species.

In 1986 ZHANG reported a new species *Ceratomantis yunnanesis* (Mantidae:Oxypilinae) from China. In the same year the same author published a paper on a new species *Humbertiella nade* from the same place. GUERRERO, CUKIER and MAGGESE in 1986 noted a specific taxonomic character of mantids viz. chorion and micropyle specificity to determine four species of the genus *Coptopteryx* viz. *C. viridis*, *C. gayi*, *C. argentina* and *C. thoracica*. Scanning electron microscopy and phase contrast microscopy were used for this study.

In 1987 ROY published a paper on general observations on the systematics of Mantodea. In the same year NICKLE wrote on some immature insects of Order Mantodea. CANNINGS in 1987 reported a new ground mantid *Litaneutria minor* from British Colombia. In the same year LA GRECA and LOMBARDO published a paper on the genus *Chrysomantis* Giglio-Tos, with descriptions of four new species.

The same authors in the same year made hypothesis on evolutions of Palaearctic species of the genus *Iris* Saussure on the basis of the different types of the discoidal spot of the metathoracic wing. In the same paper they also on the basis of their study of Mantodea of Seistan (Iran) which included a new species of a new genus, *Lobothespis vignai*(Oxythespinae). They also discussed the subfamily Oxythespinae and distinguished two phyletic lines to which they gave the rank of tribes viz. Oxyphespini and Severini. WANG in 1987 prepared key to common mantids of horticultural forests of Kunchong Zhishi, China.

BALDERSON in 1988 reported *Acromantis australis* Saussure (Mantodea:Hymenopodidae) which was a new family and subfamily record for Australia. LOMBARDO (1988) referred to the rich collection of mantids from Somalia which includes thirty six species. The new species recorded in this paper were *Oxyelaea stephaniae*, *Leptocola gracillis* and *Compsothespis brevipennis*. He also studied *Junodila hararensis* Roy, *Catasigerpes acuminatus* Kevan which were first reports from Somalia. ZHENG (1988) described two new species of the genus *Creobroter* Serville from China viz. *C. nevulosus* and *C.jiangxiensis*. MILLEDGE in 1989 reported a new species of the new genus *Scolodera paardalotus* from Queensland (Australia). The same author in 1990 made a revision of the genus *Neoxypilus* Beier (Mantodea:Amophoscelidae, Paraoxypilinae).ZHANG in 1990 published a paper on a new species *Hierodula (Rhombodera) latipronotum* from China.In the Same year NICKLE studied the systematics of the Mantodea of North America.

In 1991 PETERSON made a study of grasshoppers and mantids of the world. TERRA in 1991 from Brazil described a new species of the genus *Xystropeltis* Rehn (Mantodea:Vatidae) viz. *X. quadrilobata*. EHRMANN(1991 made systematic and biological remarks on the genus *Telomantis* Giglio-tos. This genus represented with three species in East Africa.. LOMBARDO in 1991 made remarks on the genus *Severinia* Finot 1902. He considered that *Amblythespis* Chopard 1943 a senior synonym of *Severinia*. It was also suggested that the males presently attributed to *Severinia lemorol* Finot 1902 be transferred to new genus *Paraseverinia*. In addition to this he erected a new genus *Somalithespis* (Oxythespinii), characterised by the presence of a pre apical lobe on the mid femur, a character found for the first time among the tribe Oxythespinii. In the same year LAMBORDO published another paper on Ethiopian mantids. He studies twenty species of Mantodea from southern area of Ethiopia including a new species *Empusa dialaticollis* characterised by thick marginal spines on the foliaceous pronotum.

JANTSCH (1991) reported a new species of Pseudomiopteryginae belonging to the family Mantidae from Brazil viz. *Eumiopteryx magna*. Key to the species of *Eumiopteryx* is also added in this paper. ZHANG in 1991 reported a new species of *Hieroduella* Giglio-Tos from China. BALDERSON in 1991 published a text book for students and research workers in which he added a chapter on Mantodea.

ROY in 1992 reported a new genus *Mantilla* very close to *Mantis* Linnaeus and *Statilia* Stal and described the type species *Mantilla ehrmanni* from Africa (Kenya). He also added remarks on the distribution of different species of the three genera viz. *Mantis*, *Statilia* and *Mantilla*. LOMBARDO (1992) reported a new species *Euthyphleps tectiformis* (Toxoderinae) from Afghanistan. This species could be easily distinguished from other species of the same genus by the presence of a spine on the posterior edge of the pronotum and by the presence of the cercus without any dentate apex. In the same year LOMBARDO published another paper on Mantidae in which he described a new species from Thailand viz. *Rhombodera fusca* which is characterised by a strong pronotum with parallel margins. This species is similar to *R. butleri* Wood Mason 1878, from which it can easily be distinguished by the shape of copulatory apparatus. MUKHERJEE, HAZRA and BALDERSON in 1992 studied the type specimens of Mantodea in the Zoological Survey of India collections, Calcutta, India.

CERDA (1993) studied the intraspecific stability in the general shape of different specialized structure of phallomeres. On this context he observed nineteen species representative of nine genera and three families of Neotropical mantids.

WANG, TIANQUI, XIANWEL, YIN, HAISCHENG and SHANGHAI (1994) reported a new species of the genus *Hymenopus* viz. *H. coronatoides* from China. JANTSCH in the same year reported a new species of neotropical Pseudomiopterygini

(Mantodea, Mantidae Thespinae) from Brazil which was characterised by small size, and with brownish lateral margins of pronotum which is distinctly ciliated.

MUKHERJEE, HAZRA and GHOSH in 1995 published a total 162 Indian species under 68 genera of 5 families of Mantidae . This laborious work is the comprehensive review of mantid taxonomy including descriptions of taxa, various developmental stages, notes on habitat preference in relation to temperature, altitude, vegetation and other factors. The patterns of distribution within India in relation to Oriental Region and other zoogeographical regions is also discussed.

LOMBARDO in 1995 reported a new species under new genus viz. *Parahestiasula obscura* from Nepal (Mantodea, Hymenopodidae), which is characterised by the presence of three strong processes on the fastigium of the vertex and has prominently lobed median and posterior femora. TERRA (1995) made a systematic revision of neotropical genera of mantids containing 74 genera grouped under 6 families. A key to the Neotropical subfamilies and genera was presented. In this paper he erected a new genus *Raptrix* (Acanthopidae, Acontisnae). LOMBARDO (1995) in another paper made a review of the genus *Popa* Stal (1856). It is suggested that *Mantis undata* Fabricius (1793) does not belong to the genus *Popa* Stal but to the Indian genus *Ambivia* Stal (1879). The systematic position of the species of *Popa* was reexamined and a single species *Popa spurca* Stal (1856) was attributed to genus. This species is differentiated into two subspecies viz. *Popa spurca spurca* Stal (1856) and *Popa spurca batesi* Saussure and Zehntner (1895). Both these species are

widespread throughout Africa, south of Sahara, except in the east of Africa where a population of another subspecies *Popa spurca crass* Giglio-Tos (1917) was found.

JANTSCH in 1995 reported two new mantids *Jithrone clauseni* from United States of America and *Chaeteessa nana* from Brazil. He also recorded the male of *Pogonogaster tristani* Rehn (1918) in this paper. The key for identification of these new species were also added in this paper.

EHRMANN (1996) studied the Mantodean fauna of Egypt. According to him 46 species of mantids occur in Egypt. He described a new species *Severinia ullirichi* and also redescribed *Heterochaeta pantherina* Saussure (1872). In his paper, in 1996, ROY made a revision of the fossil mantids from Palaeocene of Menat (France).

In 1997, MILLEDGE made a revision of the tribe Archimantini (Mantodea, Mantidae, Mantinae). KLASS in 1997 published a paper on the external genitalia and phylogeny of Mantodea. LA GRECA and LOMBARDO in 1997 reported a new species of *Pseudcanthops* Saussure (1870) viz. *P. lobipes* from Bolivia, characterised by the presence of a lobe at the center of the median and posterior tibiae. It appeared related to *P. spinulosa* Saussure (1870) from which it differs in the shape of vertex fastigium, in the stronger metazonal and in the shape of its urosternal lateral lobes of the copulatory apparatus. BALDERSON, RENTZ, and ROACH in 1998 prepared a zoological catalogue of Australia in which they dealt with other Mantodea also.

LOMBARDO in 1999 made remarks on the genus *Metriomantis* Saussure and Zehntner with descriptions of two new species and a new genus, the new genus being *Rehniella*. The same author reexamined 6 species of *Metriomantis* viz. *M. cupido* Saussure, *M. ovata* Saussure and Zehntner, *M. paraensis* Giglio-Tos, *M. pilosella* Giglio-Tos, *M. planicephala* Rehn and *M. amplipennis* Stal. He described a new species *Metromantis occidentalis* in this paper.

In 1999 ROY updated the knowledge of the genus *Oxypilus* Audinet-Serville (1831). He also described two new species of the same genus in this paper. In 2000 HEGDE published a paper on mantid fauna of Sanjay Gandhi National Park Mumbai (India) with some new records from Maharashtra State. He listed eleven species belonging to four families of mantids viz. *Amorphoscelis annulicornis* Stal, *Hestiasula brunneriana* Saussure, *Creobroter gemmatus* Stal, *Humbertiella affinis* Giglio-Tos, *Humbertiella indica* Saussure, *Humbertiella nigrospinosa* Sjostedt, *Deiphobe infuscata* (Saussure), *Deiphobe incisia* Werner, *Hierodula saussueri*, Kirby, *Herodula (Rhombodera) butleri* Wood Mason and *Gongylus gongylodes* (Linnaeus).

GHATE, RANE and RANADE in 2000 published a paper on recent record of *Creobroter apicalis* Saussure in Pune (Maharashtra) and Kumta (Karnataka) India. RANE, RANADE, GHATE and MUKHERJEE in 2000 recorded and redescribed the female *Acromantis montana* Giglio-Tos from Karnataka, India.

LOMBARDO (2000) reported a new species viz. *Stenophyla lobivertex* from Amazonia. This new species differs from *S. comigera* Westwood by the remarkable size of median process of vertex and by the shape of the male genitalia.

MATERIALS AND METHODS

Vyjayandi. M.C “Studies on the alpha systematics of the mantid fauna (insecta:mantoidea) of Kerala state” Thesis. Department of Zoology, University of Calicut, 2002

Chapter II

Materials and Methods

MATERIALS AND METHODS

Collection work

Mantids are collected from different habitats of Kerala like Tropical Rain Forests, Deciduous Forests, Grasslands, Mangrooves, Human inhabitations etc. for the present investigation.

Study Area

During the period of study mantids are collected from all over the 14 districts of Kerala State. (Fig.1) Kerala is situated at the South Western corner of Indian subcontinent, sandwiched by Arabian sea at the west and Western Ghat at the east. This narrow strip of land is with a total area of 39,000 sq.km, which is 1.18% total area of the country. It extends between northern latitudes $8^{\circ} 18'$ and $12^{\circ} 48'$ and eastern longitudes $74^{\circ} 54'$ and $77^{\circ} 48'$. From the southern extremity Parassala, Kerala stretches along the coast of Arabian sea about 580 kms. The North and North-east boundary of Kerala is Karnataka state, the South and south-east boundary being Tamilnadu. The width of Kerala at extreme North is the least of 32 kms and varies towards south to over 120 kms in the middle.

The three physiographic zones of Kerala are

- Highlands above 76 metres
- Midlands 7.6 to 76 metres

- Lowlands below 7.6 metres

The highlands includes slopes and peaks of Western Ghats with range in altitude 900 metres to 1800 metres. This region include Tropical Rain Forest and Mixed Deciduous Forest.(Plate I Figs.1-3 and Plate II Figs.1-3).The human inhabitations in this region results in the plantations of tea, coffee, rubber and cardamom.

The midlands lie between highlands and lowlands with undulating hills and valleys, (Plate III Figs.1-3) extends upto a height of 300 metres to 600 metres. This region is with extensive cultivation of cashew, coconut, arecanut, tapioca, banana, pepper, sugarcane and vegetables.

Lowlands lies within 30 metres to 300 metres high (Plate IV Figs.1-3). This includes coastal areas of Arabian sea, basin of 44 rivers, mangrove forests and backwaters. This is the land of coconut and rice.

Ecodiversity of Kerala thus featured different types of ecosystems, forests, wetlands, mangrooves and aquatic systems. By its location and topography (in particular the position of Western Ghats) Kerala reaches its unique environmental characteristics and provides a unique assemblage of diversified fauna of mantids.

Climate

Kerala has the typical tropical, coastal climate which is divided into three periods viz. summer, monsoon and winter. Summer period is from the latter half of February to the end of May. The monsoon period is divided into South-west monsoon

during the months of June to September and North-east monsoon from September to November. During this period Kerala gets an annual rainfall ranging from 1000 to 7000 millimetres and average atmospheric humidity of 70%. From December to the first half of February is the winter season in Kerala. The temperature is moderate here ranging from 19⁰C to 37⁰C with less diurnal variation.

Methods of collection

Each group of insects requires its own specialized technique and apparatus for collecting them. Mantids usually appears soon after the first monsoon. The newly emerged ones are usually attracted to light. They are captured by hand picking using sweep nets, glass specimen tubes and killing bottles.

(a) Sweep net and Sweeping

Sweeping is one of the effective way s of collecting mantids. The sweep net designed by NOYES (1982) is used for collecting mantids. The frame is constructed in aluminium, attached to which is a net bag. The triangular head increases the surface area of the net in contact with the ground when sweeping the grassland.

The triangular frame is with sides measures 48 x 46 x 48cm. The net handle is made up of 2cm aluminum tube about 106.7cm long. The frame can be fitted to one end of the handle. This facilitates easy separation of frame from the handle and allows the net to be used as far away from the body as possible. The long handle makes

possible sweeping underneath low over hanging bushes easier and extends the area of each individual sweep.

The net bag measures 60cm in length and is made up of durable cloth which allows the easy passage of air. The top of the bag which fits around the frame should be made up of a tough material such as canvas. The bag can be attached to the frame by strong wire threaded alternately through the bag and holes drilled at intervals of not more than 5cm through the frame for this purpose. (Fig.2).

When sweeping, it is important to choose an area where the vegetation is as diverse as possible. A grassland with a good selection of flowering plants surrounded by several kinds of bushes and trees is an ideal place for sweeping. The fringe of paddy fields also serve good for sweeping to collect mantids. Along with adults the nymphal stages are also trapped in the net while sweeping. The adults are separated and the nymphs are transferred to cages for rearing.

(b) Rearing

Wooden cages of size 30 x 30 x 30cm were used for rearing mantids. The sides were covered with aluminium sieve. A glass door was also installed. The legs of the cages were kept in petri dishes containing water to prevent the attack of ants. The floor of the cage is filled with soil upto 2 inch thickness, some grasses and sticks were placed in the cage (Fig.5). The humidity within the cage was maintained by sprinkling water. The gravid females were kept in these cages. They lay the ootheca

on the sides of the cages or on sticks kept on it. Within 1-2 weeks, the first instar nymphs would emerge. They were separated into wide mouthed glass tubes and covered with muslin cloth. Small flies like *Drosophilla* were served as food for them. After third or fourth moult they were fed with bigger flies like house flies or other type of small insects that would appear around electric lamps during night time or insects collected by sweeping. Once they become adults, they were fed with butterflies, moths, grasshoppers or even cockroaches.

(c) Handpicking

Mantids usually await for hours motionless on trees or twigs or on the walls for its moving prey. At that time it was easy to collect them by handpicking.

(d) Glass Specimen Tubes

This is an ordinary flat bottomed glass tube with a cork stopper. 7cm x 2.5cm sized tube was convenient for this purpose (Fig.3). The mouth of the tube was lowered towards the mantid. As the mantid slowly moved into the tube the stopper was placed trapping the insect in the tube.

(e) Light trap

Mantids were usually attracted to light particularly immediately after their emergence. Exploiting this character, they can be collected by using light trap. The source of light is the fluroscent mercury vapour lamps. As they came towards the vicinity of the light, they can be easily picked up by hands or collected using glass specimen tubes or directly transferred to killing bottles.

Killing and Mounting

Mantids are killed for directly or using killing bottles.

a) Direct killing

The insects collected by various methods can be transferred to a clean wide mouthed bottle and containing cotton soaked with ethyl acetate. After sometime the insect get killed and was ready for pinning.

b) Killing bottle

Mantids can be directly collected from the smooth substratum using killing bottles. A wide mouthed bottle of size 17cm x 7cm with a tight fitting lid will serve the purpose. A thick mixture of Plaster of Paris and water was poured into the bottle about 5cm-7.5cm thickness. When the plaster of paris settled a little ethyl acetate was poured into it, which got absorbed by the plaster. Then it was covered with tissue or cellulose wadding. With frequent use particularly in hot weather the volatile ethyl acetate may escape. Then the bottle can be recharged with ethyl acetate. The killing bottle thus prepared was placed over the mantid when it sits on any smooth surface (Fig.4). The insect was drawn into the bottle and then the lid was placed tightly. Soon it get killed depending on the size. The killing bottle should be kept clean and dry, and the insect should be removed as soon as they die to avoid loss of colour. When insects are kept for long time after their death they become too stiff and brittle to pin. In such case they must be "relaxed" before pinning.

Handling prior to dry mounting

(a) Evisceration or gutting

It is important to eviscerate(remove the gut and other internal organs) of mantids especially the large ones or gravid females. Evisceration is also called 'gutting'. It was carried out by making a slit along the side of the metasoma at the plural membrane using fine, sharp scissors and removed the body contents with a pair or fine forceps. A mixture of 3 parts of talcum powder and 1 part of boric acid were dusted into the body cavity and then dried.

(b)Relaxing chamber

Relaxing involved placing the dry specimens in a water saturated atmosphere preferably with a mould deterrent (a mixture of phenol and camphor), for one or two days depending on the size of the mantid. A dessicator or a suitable water proof box was used for this purpose. Wet sponge or damp sand was placed at the bottom of the container, and the insect was kept above it in a tissue paper and the container was closed with a tight fitting lid. The smaller mantids were relaxed within 24 hours but the larger specimens took longer period. During this time they were checked regularly to ensure that they did not become too wet.

Mounting

The mantids were pinned using insect pin number 3 size of 36mm x 0.53mm made by Newy Goodman and Co., England. The pin was inserted at the right side of mesosoma. Care was taken not to obstruct any diagnostic characterestic of the insect during the pinning procedure. The specimen was positioned in such a way that about

7mm of the pin was protruding above the insect to hold it and an ample space below the insect meant for further manipulations of labelling. While pinning the elytra and the hind wing were spread properly.

Spreading board

This is otherwise known as 'setting board'. This was constructed from pieces of poly ethylene foam or soft cork glued to sheets of plywood with a range of groove and board width to hold the mantids of different body sizes and wing spans (Fig.6).

The appendages like antenna, legs and wings were spread away from the body of the insect. The antenna and legs can be held in position with pins. The wings were opened and held horizontally at right angles to the body on the setting board using pieces of tracing paper.

Preservation

After spreading the insect was left below an electric lamp for drying. After drying the setting papers were removed. The data labels were placed in the order of collection data, identification and serial numbers in sequence. The collection data contained the informations like the name of the country, state, exact locality, name of collector and date. Thus the labeled specimens were kept in insect boxes. Naphthalene balls or paradichlorobenzene were placed in the boxes to protect them from the attack of other insects and fungi.

Observation

The mounted specimens were observed under Olympus(Japan made) and M₃Z WILD Stereozoom(Switzerland made) microscopes.

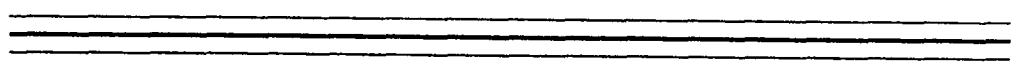
Illustrations

The figures were drawn using the drawing tube of M₃ZWILD Stereozoom microscope. The figures thus obtained were reduced or kept as such.

SYSTEMATIC STATUS AND GENERAL
FEATURES OF ORDER MANTODEA
(=MANTOIDEA OR MANTEODEA)

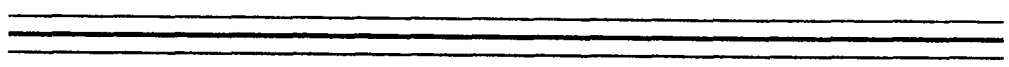
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11.1.12



Chapter III

Systematic Status of Mantodea



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SYSTEMATIC STATUS AND GENERAL FEATURES OF ORDER MANTODEA(=MANTOIDEA OR MANTEODEA)

Mantids were formerly placed under the Order Dictyoptera. According to Wood-Mason they belong to Order Orthoptera. They were considered closest to Order Isoptera. Fossil records show that mantids had been existing from Palaeocene period (ROY 1996).

Considering the special characteristics, mantids are now placed in a separate Order Mantodea BURMEISTER (1838) under Super Order Blattopteroidea.

WOOD MASON (1889) placed mantids under the Order Orthoptera in family Mantodea. He divided the family Mantodea into two grades viz. Grade A Promantodea which included the Subfamily Amorphoscelidae Stal with four genera and Grade B Eumantodea with two Subfamilies viz. Subfamily 1 Eremiaphilidae Stal with seventeen genera and Subfamily 2 Mantidae Stal with eight genera.

GIGLIO-TOS (1927) divided the family Mantidae into 32 Subfamilies and 368 genera while recording the world fauna of mantids in 'Das Tierreich'.

In this work he grouped many heterogeneous species together. BEIER (1964) divided the Order Mantodea into 8 families:

- Family Chaeteesidae
- Family Metallyticidae
- Family Mantoididae
- Family Amorphoscelidae
- Family Eremiaphilidae

- Family Hymenopodidae
- Family Mantidae
- Family Empusidae

MUKHERJEE, HAZRA and GHOSH (1995) made a systematic list of mantids so far known from India which included 6 families, 19 subfamilies, 68 genera and 162 species. The 6 subfamilies reported from India are (1) Family Metallyticidae Chopard, (2) Family Amorphoscelidae Stal, (3) Family Eremiaphilidae Lefebvre, (4) Family Hymenopodidae Chopard (5) Family Mantidae Burmeister and (6) Family Empusidae Burmeister.

General features of Order Mantodea

Mantids are a group of insects, which can be easily identified by their raptorial fore legs. Being highly predaceous, the fore femur and fore tibia of mantids are with an array of spines to catch hold of the moving insects. Classification of Mantodea is based on the morphological features of the eye, vertex, frontal sclerite, pronotum, fore legs, fore and hind wings. The shape and size of cerci and phallomeres are also taken into consideration for identification of mantids. KARNY (1921) classified mantids into eight families on the basis of wing venation. The size and shape of ootheca varies with species viz. ootheca may be larger and globular and attached to

twigs in *Hierodula* Burmeister, bulged in *Mantis* Linnaeus, spindle shaped in *Gongylus* Thunberg.

Family *Metallicidae* is a group of mantids with metallic green or blue colour of body and wings. Family *Amorphoscelidae* constitutes a peculiar group of bark dwelling mantids without mantalian array of spines on the fore femur and foretibia, forefemur with a single spine in the place of the first discoidal spine and foretibia bearing only the terminal claw. Family *Eremiaphilidae* contains a group of desert dwelling mantids with a short mesosoma. Family *Hymenopodidae* is a group of mantids which possess cephalic horn. These are spectacular mantids camouflaging with flowers and twigs. Apart from the spike on the vertex, they have eye-like markings on the hind wings. Family *Empusidae* includes grotesque mantids with slender mesosoma bearing foliaceous lamina. Most widely distributed mantids belongs to the Family *Mantidae*.

TERMINOLOGY

Following are the morphological terms used in the taxonomy of Order Mantodea (=Mantoidea or Manteodea).

1. Antenna: (Fig.7) paired sensory organ on the head.
 - Scape: basal antennal segment attached to head.
 - Pedicel: second antennal segment between scape and flagellum.
 - Flagellum: distal part of antenna attached to pedicel.
 - Filiform: (Fig.7) flagellum thin thread like.
2. Apterous: completely wingless.
3. Arolium: (Fig.11) small scale like lobe between tarsal claws.
4. Brachypterous: with elytron and hind wing shorter than metasoma, but overlapping or touching each other.
5. Cercus: (Fig.13) a paired process variously shaped and sized at base of the supra anal plate.
6. Claw: (Fig.12) one pair of claws at the apex of distal tarsal segment.
7. Claw groove: the groove on the femur where tibial claws rests.
8. Clypeus: (Fig.9) facial sclerite between frontal sclerite and labrum.
9. Coxa: (Fig.11) basal segment of leg, by which the leg is attached to the body.
10. Discoidal spines: (Fig.11) row of spines on the forefemur between external and internal rows of spines.
11. Elytron: (Fig.14) tegmen, pl. elytra = tegmina, forewing.
12. External spines: (Fig.11) spines located on the external border of

forefemur/foretibia.

13. Face: (Fig.9) whole anterior part of head visible from front.
14. Femur: (Fig.11) basal part of leg between trochanter and tibia.
15. Frontal sclerite: (Fig.9) the facial sclerite beneath the antenna, in between the eyes and above the clypeus.
16. Gena: (Fig.9) lateral part of the head.
17. Internal spines: (Fig.11) row of spines at the internal border of forefemur/foretibia
18. Labrum: (Fig.9) upper lip.
19. Mesosoma: (Fig.10) the prothorax which is variously modified.
 - Prozona: (Fig.10) part of mesosoma between head and coxal orogin.
 - Metazona: (Fig.10) part of mesosoma between coxal origin and posterior tip of it where wings originate.
20. Metasoma: (Fig.16) abdomen.
21. Mesosternum: ventral part of mesosoma.
22. Occiput :(Fig.8) lower part of vertex.
23. Reticulation: net of veinlets on the membrane of elytron.
24. Supra anal plate: (Fig.13) eleventh abdominal tergite covering the anus from above.
25. Supra coxal dialation: (Fig.10) dialation of mesosoma at the junction of prozona and metazona.
26. Tarsus: (Figs.11&12) four segmented distal part of leg.

27. Metatarsus: (Figs.11&12) first tarsal segment.
28. Tibia: (Figs.11&12) part of the leg between femur and tarsus.
29. Venation: (Figs.14&15) distribution and pattern of main veins of elytra and hind wings and areas between them.

(followed Giglio-Tos 1927, Mukherjee 1995)

Costal vein (Mediastinal vein) (C): (Figs.14&15) first main vein of elytra and hind wing .

Subcostal vein(Anterior radial vein): (Figs.14&15) second main vein on the elytra and hind wing.

Radial vein (Posterior radial vein): (Figs.14&15) third main vein of elytra and hind wing.

Cubitus (Discoidal vein): (Figs.14&15) fourth main vein on the elytra and hind wing.

Posterior cubitus vein(ulnare vein): (Fig,14&15) vein seen beneath the fourth vein.

Anal veins: (Figs.14&15) veins at the posterior base of elytra and hind wing.

†

Areas of wing

Costal area: area between costal vein and elytra and hind wing border.

Subcostal area: area between costa and subcosta.

Discoidal area: area between subcosta and anal vein.

Anal area: area posterior to anal vein of elytra and hind wing.

Anal membrane: basal membraneous flap of the elytra.

30. Vertex: (Fig.8) dorsal upper part of the head above the occiput.

ABBREVIATIONS

Abbreviations of Depositories:

Cali. Uni. Campus: Calicut University Campus

DZCU: Department of Zoology , Calicut University, Calicut, Kerala, India,

FRID: Forest Research Institute, Dehra Dun, India.

MNHN:Museum National d' Historie Naturelle, Paris, France.

BMNH: Natural History Museum, London, England.

NHMB: Naturhistorisches Museum, Basel, Switzerland.

NHRM:Naturhistoriska Riksmuseet, Stockholm,Sweden.

SJCT: St. Joseph's College, Thiruchirappally, India.

ZMHU:Zoologisches Museum der Humboldt- Universitat, Berlin.

ZSI: Zoological Survey of India. Culcutta (Kolkotta),India.

ZSIC: Zoological Survey of India, Calicut, Kerala, India.

Following Abbreviations are used in the descriptions

OOL: length between margin of eye and lateral ocellus.

OD: ocellar diameter.

POL: length between two lateral ocelli

WLS: Wild Life Sanctuary

TRF: Tropical Rain Forest

OBSERVATIONS AND RESULTS

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Chapter IV

Observations and Results

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OBSERVATIONS AND RESULTS

During the present study, many hundreds of specimens belonging to the various families of order Mantodea were collected from different parts of Kerala(Fig 1). Under this order, about 38 species (including one extra limital species) belonging to 4 families, 26 genera were identified. Among this 4 species have been described new to science. All these new species were described in detail. In the case of known species with inadequate descriptions, redescriptions were provided.

A dichotomous key to the Indian families of order Mantodea, keys to subfamilies, genera and species are presented. In addition, a check list of the genera and species of order Mantodea is also provided.

ORDER MANTODEA Burmeister

(=MANTOIDEA or MANTEODEA)

Diagnostic Characters:

Carnivorous, predator insects with raptorial forelegs, forefemur and fore tibia with array of spines to enable the insect to catch hold of its prey, feeds only on moving preys, show camouflage and peculiar reproductive behaviour. The head can rotate at about 180°. Mouthparts biting and chewing; mesosoma longer or shorter than forecoxa; usually with two pairs of wings; forewing usually subopaque hindwing hyaline; wings folds across each other.

Key to families

(Modified from Mukherjee & Hazra 1995)

1. Body metallic bluish green; forefemur with elongated external spines
*Metallyticidae*
- Body not metallic coloured; forefemur external spines not elongated
(2)
2. Mesosoma almost squarish or little longer than broad.(Fig.19).....(3)
- Mesosoma usually distinctly longer than broad.(Fig.37).....(4)

3. Foretibia without ventral rows of spines; forelegs reduced
 *Amorphoscelidae*
- Foretibia with ventral rows of spines; forelegs stout
 *Ermiaphilidae*
4. Antenna of male pectinate; internal spines of forefemur with each long
 spine alternating with 3-4 short spines (Fig.26)... .. *Empusidae*
- Antenna of male simple; internal spines of forefemur with each long spine
 alternating with one short spine (Fig.32)... .. (5)
5. Vertex usually with spine; foretibial spines curved, numerous and arranged
 closely; forewing usually with eye like marking (Fig.67)) *Hymenopodidae*
- Vertex usually without spine; foretibial spines straight and well separated;
 forewing without eye like marking (Fig.132)... .. *Mantidae*

FAMILY AMORPHOSCELIDAE

Mostly bark dwelling. Body small sized; eyes round and large; occiput with backwardly directed and pointed conical knobs. Mesosoma short, depressed, with paired large tubercles; forelegs depressed; forefemur and foretibia without usual mantid-like pattern of spines, forefemur with a single spine foretibia ornamented with a single large claw.

One subfamily with one genus occur in India.

Subfamily Amorphoscelinae

Mesosoma short depressed, with knob like paired tubercles; cerci expanded at distal end.

Genus *Amorphoscelis* Stal

Amorphoscelis Stal 1871. *Ofvers.K.Vetensk.Akad.Forh.* 28:401. Type species *Amorphoscelis annulicornis* Stal.

Diagnostic characters:

Head wider than mesosoma; eyes round, prominent; frontal sclerite transverse, narrow, superiorly truncate and arched laterally; vertex with tubercles; occiput produced into large conical protuberances. Mesosoma short, somewhat triangular with paired tubercles; forecoxa smooth; forefemur with a single discoidal spine; no

external or internal spines; foretibia depressed with only a terminal claw; no external or internal spines. Cerci flat at distal segment.

Key to Indian species of *Amorphoscelis*

(Modified from Mukherjee&Hazra 1995)

1. Mesosoma with 2 anterior and 2 posterior tubercles.....2
 - Mesosoma with 2 posterior tubercles only, anterior tubercles absent
.....*A. brunneipennis* Beier
2. Body ventrally black; forefemur internally black.....*A. annulicornis* Stal
 - Body ventrally brick red; forefemur internally brown.....*A. singaporana* Giglio-Tos

Amorphoscelis annulicornis Stal

(Figs.16-21)

Amorphoscelis annulicornis Stal 1871. *Ofvers K. Vetensk. Akad. Forh.* 28:401.

Type. India (NHRM)

Amorphoscelis Indica Giglio-Tos. 1915. *Bull Soc. Entomol. Ital.* 46:33. Holotype.

M. India: Ratnagiri.(BMNH)

Amorphoscelis keiseri Beier. 1956. *Verh. Naturf. Ges. Basel.* 67:33. Holotype. M.

Sri Lanka. N.C.P. Anuradhapura(NHMB)

Plesiotype: Male Body length 19 mm.

Colour: light brown with dark brown tinge; vertex light earth brown with fuscous dots; ocelli orange; frontal sclerite; centrally black, sides brown ; antenna, eyes, labrum, clypeus and mesosoma concolorous with vertex. Forelegs: anterior inner side of coxa and femur internally black, trochanter with black tinge; middle and hind legs: coxa black, femur and tibia cream with fuscous bands ; forewing semiopaque, concolorous with mid and hind legs; hind wings transparent. Metasoma black.

Head: bluntly triangular, 3.14x wider than high ; vertex depressed, on either side of median line with 2 large tubercles; posterior side with triangular carina; occiput produced into 2 large pointed conical tubercles; eyes round, projecting laterally; ocelli large, slightly elevated, placed slanting; POL : OD : OOL = 12:4:7 ; antenna filiform ; frontal sclerite transverse, 5x wider than high, carinate in middle, superiorly truncate, laterally arched, laterally with wing like, depressed extensions.

Mesosoma: short; depressed; 1.5x wider than long; disc not smooth, with a pair of anterior and posterior large pointed tubercles; metazona mid longitudinally carinate; inferiorly triangular; forelegs simple; coxa a little shorter than femur, without spines; femur simple with a single median spine corresponding to distal spine, no external or internal ones; a row of denticles present at inner edge, 5x longer than

tibia; tibia short, without external or internal spines, tibial claw well developed, 1.5x longer than tibia ; metatarsus 4x longer than tibia and 1.3x longer than all other tarsal segments; metatarsus and other tarsal segments with pubescence; middle and hind legs long, simple; coxa short, femur and tibia equal in size, hindtibia 1.6x longer than metatarsus; metatarsus 1.6x longer than all other tarsal segments, with pubescence; wings longer than metasoma; forewing semiopaque, leathery, costal area opaque with reticulate veins, anterior radial vein trifurcates at proximal discoidal area; posterior radial vein not branching, ulnare vein bifurcates, with reticulate venation; hindwings hyaline, costal area with transverse veins, radial veins trifurcates at middle.

Metasoma: shorter than wings; fusiform with racket shaped cerci.

Materials examined: Plesiotype: Male, India, Tamil Nadu, Kuttalam between 1991-1993. Edwin (DZCU).

Biology: Unknown.

Habitat: Kuttalam is a tropical forest region where humidity is high. The collection is made at the fifth water fall of Kuttalam. It is an undisturbed area of tropical rain forest.

Discussion: This species *Amorphoscelis annulicornis* Stal is closely related to *Amorphoscelis brunneipennis* Beier in the following characters: 1. Body brown.

2. Frontal sclerite narrow, mid superior edge truncate and lateral sides arched. 3. Mid and hind legs with femur and tibiae with brown rings. This species *A. annulicornis* Stal differs from *A. brunneipennis* Beier in the following characters: 1. In *A. annulicornis* there are 2 tubercles each on the anterior and posterior border of mesosoma (In *A. brunneipennis*, there are only 2 posterior tubercles on mesosoma). 2. Mid and hind coxae black in *A. annulicornis* (Brown in *A. brunneipennis*).

FAMILY EMPUSIDAE

Body medium to large, greenish or brown; always winged. Vertex prolonged into conical protuberance; antenna of male bipectinate; clypeus and frontal sclerite carinate; eyes oval. Forefemora with 5 external and 4-5 discoidal spines, internally 1 large spine alternates with 3-4 smaller spines; foretibia with numerous spines externally and internally. Metasomal segments usually with expansions; supra anal plate short, broad, transverse. Cerci simple.

Two subfamilies are known from India.

Key to subfamilies

Mesosoma slender, long, forecoxa with prolonged spiniform process at distal end.....*Empusinae*

- Mesosoma short, depressed; forecoxa without spiniform process at distal end.....*Blepharodinae*

Subfamily Empusinae

Winged forms; in male antenna pectinate. Mesosoma slender, longer than forecoxa; forecoxa with backwardly directed spiniform process at distal end.

Key to genera

- Fore femur with dialated superior end; mid and hind femora with ventral lobes..... *Gongylus* Thunberg
- Fore femur without dialation; mid and hind femora without ventral lobes..... *Empusa* Illiger

Genus *Gongylus* Thunberg

Gongylus Thunberg 1815. *Mem. Acad. Sci. St. Petersburg* 5 : 220.

Type species *Gongylus gongylodes* (Linnaeus)

Diagnostic characters:

Body bizzare shaped; brown or yellowish green. Head small, vertex with protuberance; antenna filiform in the case of female, pectinate in male. Mesosoma slender with distal lamellar, rhomboidal dialation; forecoxa with backwardly directed, distal spiniform process; superior border of forefemora dialated; with 5 external and 4

discoidal spines ;mid and hind legs slender, coxa with external lobes; femur with distal, triangular lobe dorsally and semicircular lobe ventrally; wings well developed; in males wings longer and in female shorter than metasoma. Metasoma with lateral laminae.

Distribution: Asia, Oriental Region.

Key to Indian species of *Gongylus* Thunberg

(Modified from Mukherjee & Hazra 1995)

- Dialation of mesosoma rhomboidal, covers one third of mesosoma,
lateral extension angular.....*G. gongylodes* (Linnaeus)
- Dialation of mesosoma cordiform, almost entirely covers the mesosoma,
lateral extension rounded.....*G. trachelophyllus* Burmeister

***Gongylus gongylodes* (Linnaeus)**

(Figs.22-27)(Plate IX Fig.4)

Grillus (Mantis) gongylodes Linnaeus 1758 *Syst. Nat.* 10 426.

Mantis gongylodes Linnaeus 1767 *Syst. Nat.* 2(10) 610.

Mantis flabellicornis Fabricius 1793 *Entomol. Syst.* 2 16.

Gongylus gongylodes Saussure 1871 *Mem. Soc. Geneve* 21 185.

Plesiotype: Female Body Length 95mm.

Colour: Greenish brown. Vertex testaceous with yellowish green tinge ; eyes fuscous to black ; frontal sclerite, clypeus, labrum, gena, middle and hindlegs fuscous. Mesosoma, forelegs yellow with brown tinge; internal lower half of forecoxa black, forefemur with brown indistinct cross bars, all the spines black at apex only; forewings with costal area brown, discoidal area yellowish green; hindwings hyaline, testaceous. Metasoma brown.

Head: conical, compressed, 2x higher than wide, with anteriorly prolonged foliaceous lobes ; eyes oval ;frontal sclerite spiniform, as high as wide, with rhomboidal carinated disc; antenna filiform, short and non ciliated ;clypeus and labrum medianlly carinated.

Mesosoma: slender, 2.5 x longer than forecoxa, anteriorly with rhomboidal dialation extending from anterior tip to upper one third of metazona, prozona spatulate, metazona denticulated laterally , 4.8 x longer than prozona. Forelegs: coxa simple, middorsally carinated, apical lobes conical, backwardly directed, trochanter slender, femur foliaceous, deeply grooved ventrally, with 5 external, 4 discoidal, 8-9 long internal, 20 short internal spines, one longer internal spine alternates with 3-4 shorter spines ; femur 1.2 x longer than coxa, 2.3 x longer than tibia; tibia a little longer than

metatarsus, metatarsus 1.8 x longer than all other tarsal segments together. Middle and hind legs: coxa short, femur with distal dorsal triangular lobe and with ventral semicircular lobes; tibia as long as femur, with genicular spines; metatarsus a little longer than all other tarsal segments together.

Metasoma: broad, laterally laminated, longer than wings, carinated, supra anal plate short, subconical; cerci short, with pubescence.

Materials examined: Plesiotype: Female, India, Kerala, Cali. Uni. Campus, 20-xi-1998, U.V.K. Mohammed (DZCU). Other materials examined: 1Male, INDIA, Kerala, Cali. Uni. Campus, 11-iii-98, Raji. B (DZCU). 1Male, INDIA, Kerala, Cali. Uni. Campus, 8-v-98, Sabitha (DZCU). 1Male, INDIA, Kerala, Cali. Uni. Campus, 3-v-98, Nisha (DZCU). 1Male, INDIA, Kerala, Cali. Uni. Campus, 20-iv-99, Beena (DZCU). 1Male, INDIA, Kerala, Cali. Uni. Campus, 9-x-99, Sarasija (DZCU). 1Male, INDIA, Kerala, Cali. Uni. Campus, 16-iv-97 Kavitha (DZCU). 1Male, INDIA, Kerala, Cali. Uni. Campus, 20-iv-99, Beena (DZCU). 1Male, INDIA, Kerala, Cali. Uni. Campus, 7-v-99 Renjitha (DZCU). 1Male, INDIA, Kerala, Cali. Uni. Campus, 12-ii-99 Priya Menon (DZCU). 1Male, INDIA, Kerala, West Hill, 19-viii-99 Sitara (DZCU). 1Male, INDIA, Kerala, Malaparamba, 11-viii-99, Vyjayandi (DZCU). 1Male, INDIA, Kerala, Eranhippalam, 17-v-99, (DZCU). 1Female, INDIA, Kerala, Cali. Uni. Campus, 7-x-99 Sheeja (DZCU). 1Female, INDIA, Kerala, Cali. Uni. Campus, 11-x-98, T.C. Narendran (DZCU). 1Female, INDIA, Kerala, Cali.

Uni. Campus. 13-vii-2001, Sudheer (DZCU). 1Female, INDIA, Kerala, Chathamangalam, Nishi.K.V. (DZCU). 1Male, INDIA,Kerala, T R F (Trichur). Vellanimala, 9-x-95,K.C. Gopi. (ZSI ,Calicut.) Reg. No. 8122.1Male,INDIA, Kerala, Madayippara (Kannur), 1-vii-2001, Jaffer, (ZSI,Calicut.), Reg. No.11985. 1 Male, INDIA, Kerala,Kolavippalam (Mangroove), 10-ix-2001, Jaffer, (DZCU).

Biology: Unknown.

Habitat: Undisturbed

Distribution: India: Kerala, Tamil Nadu, Andra Pradesh, West Bengal, Indonesia , Sri Lanka.

Discussion: This species *Gongylus gongylodus* (Linnaeus) is closely related to *Gongylus trachelophyllus* (Burmeister) in the following characters : 1. Slender, anteriorly laminated mesosoma. 2. Coxa with backwardly directed, conical, apical lobes. 3. metasoma laterally foliaceous. This species *Gongylus gongylodus* (Linnaeus) is differs from *Gongylus trachelophyllus* (Burmeister) in the following characters 1. corners of mesosomal dialation angular in *G. gongylodus*. (Mesosomal dialation cordiform, lateral angles smooth in *G. trachelophyllus*).

FAMILY HYMENOPODIDAE

Diagnostic characters:

Usually medium sized (20-40 mm) mantids; brightly coloured; vertex with protuberance; frontal sclerite with spiniform process. Mesosoma almost as long as forecoxa ; claw groove at basal portion of forefemur, foretibia with closely placed and curved numerous spines, external spines apparently fused ; middle and hind legs slender, coxa with external distal and femur with ventral lobes; both wings longer than metasoma; forewings often with eye like or spiral markings. Supra anal plate transverse.

Two sub families are known from India.

Key to subfamilies

1. Frontal sclerite superiorly and medianly spiniform; without wing like or excavated extensions on either side; eyes within the circumference of head (Fig.30).....
Acromantinae

- Frontal sclerite superiorly and medianly not spiniform, with excavated or wing like extensions on either side; eyes project beyond the circumference of head(Fig.69)
Hymenopodinae

Subfamily Acromantinae

Frontal sclerite transverse, disc flat, superior edge medianly spiniform. Vertex with protuberance; eyes globular. Mesosoma laterally denticulated ; forefemur with 4 external and 4 discoidal spines; external spines of foretibiae closely packed, directed forward; middle and hind femur usually with lobes; wings well developed, longer than metasoma with coloured patches.

Only one tribe viz. Tribe Acromantini is reported from India.

Tribe Acromantini

Diagnostic characters:

Vertex with protuberance; mesosoma slender, usually denticulated laterally, fore and hind limbs with or without lobulations.

There are 9 genera under Tribe Acromantini.

Key to genera

(Modified from Mukherjee & Hazra 1995)

1. Vertex with protuberance. Mid and hind legs with lobes (Figs.29&33).....2
 - Vertex without protuberance. Mid and hind legs without lobes
(Figs.53,57&58).....5

2. Mesosoma slender ; forefemur foliaceous; internal apical lobes of fore coxa
convergent(Figs.62&63).....3
 - Mesosoma broad ; forefemur simple, internal apical lobes of forecoxa
divergent(Figs.37&38).....4

3. Disc of frontal sclerite carinated. External edge of forefemur denticulated
.....*Ephestiasula* Giglio-Tos
 - Disc of frontal sclerite not carinated.External edge of forefemur smooth
.....*Hestiasula* Saussure

4. Wings truncate at tip (Fig.34).....*Acromantis* Saussure
 - Wings round at tip (Fig.40).....*Ambivia* Stal

5. Frontal sclerite obtusely angular(Fig.54).....6
 - Frontal sclerite spiniform(Fig.30).....7

- 6 Mesosoma slender with metazonal constriction.....*Nemathoa* Wood-Mason
 - Mesosoma not slender without metazonal constriction.....*Euantissa* Giglio-Tos
- 7 Mesosoma flat, without constriction.....*Odontomantis* Saussure
 - Mesosoma slender, with constriction.....8
- 8 Forecoxa with 8-10 large tubercles; internal apical lobes convergent
*Heliomantis* Giglio-Tos
 - Fore coxa with a few weak denticles; internal apical lobes divergent
*Anaxarcha* Stal

Genus *Acromantis* Saussure

Acromantis Saussure 1870. Mitt. Schweiz. Entomol. Ges. 3:229

Type species *Acromantis formossa* Saussure

Diagnostic characters:

Vertex usually with protuberance; frontal sclerite transverse, spiniform superiorly ; eyes globular . Mesosoma slightly longer than fore coxa, usually with tuberculated margin; forelegs simple; internal apical lobes of fore coxa divergent; forefemur with 4 external and 3 discoidal spines; middle and hindfemur with proximal and distal ventral lobes. Both wings truncate, well developed, longer than metasoma and with coloured patches.

Distribution: Asia, Oriental Region

Four species are known from India.

Key to Indian species of *Acromantis* Saussure

- 1 Vertex with protuberance *A. nicobarica* Mukherjee
- Vertex without protuberance 2

- 2 Mesosoma with tubercular border in male..... 3
- Mesosoma without tubercular border..... *A. oligoneura* (De Hann)

3. Longer internal spines of fore femur entirely black, forewing
densely reticulated (Fig.34).....*A. montana* Giglio-Tos
- Longer internal spines of fore femur black at tips only, forewing less
densely reticulated (Fig.28)..... *A. insularis* Giglio-Tos

***Acromantis insularis* Giglio-Tos**

(Figs.28-32)

Acromantis insularis Giglio Tos. 1915 *Boll.Mus.Torino*.30(702)6

Plesiotype: Male Body length 32mm

Colour: clay brown. Head greenish brown; vertex light brown at centre, either side of vertex with dark brown patches; eyes light wood brown with dark blackish brown streaks and patches; ocelli reddish brown; antennal scape light wood brown with dark brown colouration; frontal sclerite light brown with dark blackish brown irregular spots; clypeus light brown with blackish brown dots. Mesosoma light brown with dark brown dots at sides of prozona, lateral border with black denticles; metazona light brown and with black tubercles laterally, prosternum black; forelegs: coxa concolorous with mesosoma, marginal spines of coxa creamy white; femur light brown externally with dark brown dots, ventral side light brown at arched top, below greenish, external spines light brown with dark brown at tips only, internal spines of femur black at both ends, middle light brown, smaller internal spines black at tips only; tibia light brown with dark brown dots, tibial spines light brown with dark brown tips, tibial claws

concolorous with tibial spines, metatarsus light brown ; middle and hind legs: light brown with dark brown dots and patches; pre apical and post apical ventral lobes of femur dark brown; forewings semi opaque, creamy brown with dark brown veins; tips of both wings ferruginous. Metasoma: brown with a green tinge.

Head: 2 x wider than high, vertex not smooth, elevated in the middle anteriorly thrown into a pointed protuberance; eyes globular, emarginate; ocelli more closely placed, oval and slanting; antenna filiform, non-ciliated; frontal sclerite anteriorly projecting, spiniform, transverse, 2.5x wider than high (width taken at the middle line).

Mesosoma: Slender, a little longer than forecoxa, prozona spatulate; metazona laterally tuberculated, 2.5 x longer than prozona; supra coxal dialation round ; forelegs: coxa not arched, outer margin with 5-7 tubercles, internal apical lobes divergent; femur slightly longer than coxa, outer margin sinuate, arched, 2x longer than tibia, with 4 external, 4 discoidal spines (the third one longest); tibial spines gradually elongates towards apex; tibial claw equal in size of metatarsus; metatarsus as equal as all other tarsal segments; middle and hind legs: coxa both in middle and hind legs shorter than femur; femur with pre apical and post apical lobes ventrally, posterior one semi circular, anterior lobe narrow and longer; hindfemur 2 x longer than hindcoxa; tibia and femur equal in size ; wings truncate; veins widely and obliquely placed with broader reticulation of venioles; forewing with opaque costal

area, discoidal area hyaline, costal vein bifurcates; in hindwing distal superior tip with dense reticulation, anterior radial vein trifurcates, posterior radial vein bifurcates.

Metasoma: fusiform, shorter than wings, supra anal plate short; cerci short.

Materials examined: Plesiotype : Male, INDIA, Kerala, Cali. Uni. Campus, 12-iv-2000 T.C Narendran,(DZCU) . Other materials examined: 1 Male INDIA, Kerala, Cherukunnu (Kannur), 5-i-2001, Celin (DZCU) 1 Male, INDIA, Kerala, Cali. Uni Campus, 30-xi-1997, Pookoya(DZCU)

Biology: Unknown

Habitat: Undisturbed

Distribution: India, Tamil Nadu, Kerala, Karnataka, Indonesia, Java, Sumatra .

Discussion: This species *Acromantis insularis* Giglio-Tos is closely related to *Acromantis montana* Giglio-Tos in the following characters : 1. Vertex with protuberance; 2.Wings truncate; 3. Mid and hind femur with ventral lobes. This species *Acromantis insularis* Giglio- Tos differs from *Acromantis montana* Giglio-Tos in the following characters: 1.Body slender in *A. insularis* (body stout in *A.montana*); 2. sharp pointed conical protuberance on the vertex in *A.insularis* (protuberance of vertex somewhat blunt in *A.montana*); 3. Costal area of forewing semiopaque, discoidal area hyaline in *A.insularis* (costal area of forewing opaque and discoidal area semiopaque in *A.montana*); 4. Discoidal area of forewing less densely reticulated in

A.insularis (discoidal area of forewing more densely reticulated *in A.montana*); 5. Internal longer spines of the forefemur , less sharp, straight and brown in *A.insularis* (internal longer spines of forefemur more sharp, curved and black in *A.montana*).

***Acromantis montana* Giglio-Tos**

(Figs.34-39) (Plate V Fig.1)

Acromantis montana Giglio-Tos 1915 *Bull.Mus. Torino*.

Plesiotype: Female body length 38mm.

Colour: Brown. Vertex clay brown with fuscous patches; eyes greenish brown with fuscous patches and streaks; ocelli coral red; antennal scape greyish brown, pedicel orange brown; flagella light brown with fuscous annulations; frontal sclerite, clypeus, mesosoma, forelegs concolorous with vertex; spines on the lateral border of mesosoma jet black; spines of forelegs dark brown at tips only; middle and hindlegs clay brown; coxa with fuscous dots; femur and tibia with fuscous annulations; forewing costal area green, rest clay brown with dark brown veins; hindwings hyaline with reddish brown distal tip. Metasoma brown.

Head: 3.7x wider than high; vertex with distinct middorsal lobe,terminating in a central triangular spike;eyes globular, emarginate; ocelli large, conspicuous; POL:

OD: OOL = 4:1:5 ; frontal sclerite 3 x wider than high, mid superior tip spiniform, disc carinated; clypeus placed perpendicular to frontal sclerite.

Mesosoma: a little longer than forecoxa, 3 x longer than broad at supra coxal dialation, supra coxal dialation round, prozona oval, with 2-4 blunt spines laterally, median carina weak; metazona constricted at middle, laterally with 5-7 strong blunt spines, median carina weak, 3x longer than prozona; Forelegs: simple, coxa with dorsal median ridge, inner margin with 5 blunt spines, internal apical lobes divergent; femur 1.2 x longer than coxa, and 2.5x longer than tibia, outer margin wavy, with 4 external, 3 discoidal, 5 longer internal 7 shorter internal spines (the distal two longer internal spines enclose two shorter ones), with genicular spines; claw groove proximally placed; tibia compressed, with 10 minute external, 12 sharp internal spines; metatarsus as long as other tarsal segments. Middle and hindlegs: coxa short, carinated; femur with ventral distal semi circular and proximal triangular lobes; tibia simple, nearly as long as femur, with 2 sharp genicular spines; metatarsus a little shorter than all other tarsal segments together. Wings truncate, forewings semihyaline, costal area opaque costal vein bifurcates at the distal tip; posterior radial vein trifurcates, anal membrane transparent veinlets form fine mesh work; hindwing hyaline, anterior radial and posterior radial veins bifurcate, anterior tip opaque.

Metasoma: shorter than wings, a little broad posteriorly, supra anal plate short, broad. cerci many segmented with pubescence.

Materials Examined: Plesiotype: INDIA :Kerala ,Trissur 15-i-2001, Vyjayandi (DZCU). Other materials examined: I Female : INDIA : Kerala, Cali. Uni. Campus, 1-x-1997, Pookoya(DZCU). I Female : INDIA, Kerala, Cali. Uni. Campus 9-v-1998 Uma.L.(DZCU). I Male INDIA : Kerala , Trissur 15 iii 2001 K.Usha (DZCU). 1 Female, Cali. Uni. Campus, 15- xii 2001, Arathy(DZCU).

Biology: Unknown.

Habitat: Undisturbed

Distribution: India: Arunachal Pradesh, Kerala, Karnataka, Meghalaya, Thripura, Indonesia, Java.

Discussion: This species *Acromantis montana* Giglio-Tos comes near to *Acromantis insularis* Giglio-Tos in following characters:1. Presence of spine on the vertex. 2. Spiniform frontal sclerite. 3. Wings truncate. This species *Acromantis montana* differs from *Acromantis insularis* in following characters : 1.Body more robust in *Acromantis montana*, (body comparatively slender in *A. insularis*); 2. The tubercles present on lateral margin of mesosoma strong in *A. montana*, (tubercles of lateral margin of mesosoma less strong in *A. insularis*); 3. Forewing with veinlets more closely reticulated in *A.montana*, (forewing with less reticulate veinlets in *A. insularis*).

Genus *Ambivia* Stal

Ambivia Stal 1877. *Bih. K. Svenska. Ventensk Akad. Handl.* 4(10):88.

Type species *Ambivia popa* Stal.

Diagnostic characters:

Body dirty brown. Vertex with sharp triangular protuberance in front of median ocellus, lobulated; frontal sclerite transverse, superiorly spiniform; eyes large and globular. Mesosoma compressed with dark tubercles both on sides and on surface, constricted at middle; forecoxa internally and distally with serrated lobes, internal apical lobes converging; forefemur with 4 external and 4 discoidal spines; middle and hind femur shorter than their tibia and with ventral lobes; wings longer than metasoma in both sexes and round at tips.

Distribution: India, Oriental Region, Srilanka, Sumatra, Borneo

Only one species is known from India and also from all over the world.

***Ambivia popa* Stal**

(Figs.40-45) (Plate V Fig.2)

Ambivia popa Stal, 1877, *Bih. K. Svenska Ventensk Akad. Handl* 4(10)88*Popa undata* F.Werner, 1908, *Ann.Mus. St.Petersburg*, 13:124, Syn.by

Giglio Tos 1915.8

Plesiotype: Female: Body length 53 mm.

Colour: Fuscous to clay brown. Head wood brown with black irregular spots and patches; the triangular horn of vertex with dense black spots in brownish background, triangular horn in front of ocelli jet black with golden brown tip; eyes golden brown with black streaks; posterior ocellus black in the centre with outer ferruginous border, median ocellus ferruginous at centre with outer border black; frontal sclerite, clypeus, antenna fuscous; flagella light brown alternating with dark blackish annulations. Mesosoma dirty brown with black denticles on disc, sides with larger black and marble tubercles; prosternum and mesosternum with densely packed black spots on brown background with a black patch across sternum where forecoxa originates; forelegs dorsally dirty brown with densely packed dark fuscous spots, ventrally pale clay brown, distal end with black patch; in between superior marginal and sub marginal ridge with longitudinally arranged black dots; dorsal outer ridge of forecoxa with 11 black spots; forefemur dorsally concolorous with forecoxa, ventrally black inner surface with large black patch starting from middle towards distal end, distal most end carries another black patch; spines of forefemur and foretibia clay brown basally with black tips; internal large spines of forefemur jet black; metatarsus

brown; middle and hindlegs clay brown with jet black spots; wings dirty brown with veins dark blackish brown alternating with creamy white patches, distally with more fummy patches; hindwings with fummy distal discoidal tip. Metasoma and cerci greyish dark brown with blackish spots.

Head: 1.3x wider than high; vertex not smooth, middle portion elevated, with conical spine; eyes globular emarginate; ocelli less conspicuous; OOL:OD:POL = 12:5:14 ; frontal sclerite 2x wider than high, transverse, mid superior edge spiniform; antenna delicate, filiform, non setaceous; clypeus carinated in middle.

Mesosoma: a little longer than forecoxa; supra coxal dialation pronounced, oval; lateral sides of prozona with 8-9 tubercles; below supra coxal dialation metazona constricts at middle; mid dorsal longitudinal abrupt carina more pronounced at posteriormost and anteriormost line of metazona, in between with a weak carina, metazonal disc not flat, slanting, not smooth, thrown into bosses, dorsal metazona form elongated rhomboidal carina, metazonal disc with scattered tubercles; metazona nearly 2x longer than prozona 3x longer than wide at supra coxal dialation, 4.5x longer than wide at middle constriction; forecoxa ridged strongly at mid dorsal side, ventrally smooth and somewhat bulging anteriorly; internal apical lobes of forecoxa convergent to form a notch; dorsally and distally forecoxa dialates to form a lobe with upper margin tuberculated; forefemur not arched, slender, tuberculated outside , with 4 external, 4 discoidal, 6 larger internal, 7 smaller internal spines (third discoidal spine longest);forefemur 1.2x longer than forecoxa, 2.4x

longer than tibia ; 13 external shorter and 13 longer internal spines on foretibia. Middle and hind legs: coxa with outer ridge, femur with middle and hind legs with pre apical ventral triangular lobe; midcoxa, midfemur and midtibia are of equal length, metatarsus much smaller, almost same as other tarsal segments; forewing semihyaline, costal and anterior radial vein bifurcate distally, pointed towards tip, stigma a little anterior to middle; hindwings transparent, costal vein bifurcates at the proximal end , discoidal vein bifurcate from middle and flare apart; both wings longer than metasoma in both sexes, not truncate, round at tip.

Metasoma: fusiform, shorter than wings ;cerci short.

Materials examined: Plesiotype: Female, INDIA, Kerala, Sulthan Bathery (Wynad), 14-iv-2000, Lambert (DZCU). Other materials examined: 1 Male, INDIA, Kerala, Cali.Uni.Campus, 11-iii-1998, T.C.Narendran(DZCU), 1 male, INDIA, Kerala, Cali. Uni. Campus, 22-i-2000, Arif (DZCU), 1 male, INDIA, Kerala, Cali. Uni. Campus, 29-ii-2000, Beena P C (DZCU), 1 male, INDIA, Kerala, Wynad, 10-v-2001, Lambert (DZCU) ; 1 male, INDIA, Kerala, Thrissur, 11-iv-2001, K.Usha (DZCU). 1Male, INDIA, Kerala, T.R.F, Athirappalli(Thrissur), 23-ix-1996, Reg.No.8774, C.Radhakrishnan (ZSI Calicut).

Biology: Unknown.

Habitat: Undisturbed Deciduous Forest

Distribution: India, Sikkim, W.Bengal, Indonesia, Sumathra, Srilanka.

Remarks: Males resemble female but with shorter body length.

Discussion: Only one species viz. *Ambivia popa* Stal of *Ambivia* Stal is recorded from India (Mukherjee, Hazra & Ghosh 1995, and Giglio Tos 1927 reported only one species of *Ambivia* i.e *Ambivia popa*) This species *Ambivia popa* has a resemblance with species of genus *Danuriella* (Westwood). The difference notice is that in *Ambivia popa* wings are longer than the metasoma for both sexes whereas in *Danuriella*, male has longer and female has shorter elytra than metasoma.

Genus *Anaxarcha* Stal

Anaxarcha Stal 1877. *Bih. K. Svenska Akad. Handl.* 4(10):81.

Type species *Anaxarcha graminea* Stal.

Diagnostic characters:

Body slender, light green. Vertex with conical spine and with prominent lateral lobes; eyes globular; frontal sclerite transverse, superiorly spiniform, bicarinated. Mesosoma slender, a little longer than forecoxa, denticulated laterally; supra coxal dialation oval; forecoxa with divergent internal apical lobes; forefemur simple, slender, superior edge straight with 4 external and 4 discoidal spines; foretibia with external spines short and forwardly directed. Middle and hind legs short. Wings delicate, longer than metasoma.

Distribution: India, Borneo.

Four species are known from India.

Key to Indian species of *Anaxarcha* Stal

1. Mesosomal border black2
 - Mesosomal border not black3

2. Longer internal spines of fore femur entirely black.....*A. intermedia* Mukherjee
 - Longer internal spines of fore femur black at tip only..... *A. limbata* Giglio-Tos

3. Prosternum behind coxal joint with black patch.....*A. graminea* Stal
 - Prosternum behind coxal joint without black patch.....*A. acuta* Beier

***Anaxarcha limbata* Giglio-Tos**

(Figs.46-51) (Plate V Fig.3)

Anaxarcha limbata Giglio-Tos 1915 *Bull. Mus. Torino* 30(702) 1 type F. Kalimantan.**Plesiotype:** Male body length 30 mm.

Colour: Green. Vertex light yellowish green with slight testaceous tinge; eyes wood brown; ocelli dark pink with black border; antenna scape and pedicel green, flagellum fuscous with light green annulations; frontal sclerite grass green. Mesosoma fore legs, middle and hind legs concolorous with vertex. Mesosoma with lateral black line, with jet black granules; all spines of forefemur black at tips only (except longer internal spines, entirely fuscous); forewings light green, semihyaline, with dark green veins; hind wings hyaline with pink veins at discoidal area.

Head: 1.8x wider than high, vertex without any protuberances, lateral lobes prominent; eyes slightly oblong, emarginate; ocelli conspicuous, POL : OD : OOL = 3 : 1 : 3; antenna filiform with minute sparsely distributed setae; frontal sclerite disc flat, laterally carinated, 2x wider than high, superior border triangular and spiniform; clypeus elevated.

Mesosoma slender, supra coxal dialation oval, 3.4x longer than wide at supra coxal dialation, prozona spatulate, metazona with slight constriction at middle,

2.6x longer than prozona, laterally denticulated. Forelegs simple, forefemur slightly longer than forecoxa, 1.8x longer than foretibia; tibia 1.3x longer than metatarsus, forecoxal margin denticulated; forefemur with 4 external, 4 discoidal, 5 longer internal, 8 shorter internal spines; foretibia with short horizontally placed 12 external, vertically placed 13 internal spines. Middle and hind legs: coxa short, femur as long as tibia, metatarsus as long as all other tarsal segments together; forewing hyaline, parallel venation at costal area, reticulately venated at discoidal area, anterior radial vein bifurcates distally, posterior radial vein bifurcates proximally and rebranches; hind wings hyaline, anterior radial vein bifurcates, with broader cross veins.

Metasoma not slender, somewhat flat, supra anal segment short, cerci short, stout, with bristles.

Materials examined: Plesiotype; Male INDIA, Kerala, Thirunelli (Wynad), 20-v-2001, Jaffer (DZCU). Other materials examined: 1 female, INDIA, Kerala, Silent Valley, 22-iv-1995, Binoy C F (DZCU).

Biology: Unknown.

Habitat : High altitudes and undisturbed tropical rain forests.

Distribution: India, Kerala, Sikkim, West Bengal, Kalimantan.

Discussion: This species *Anaxarcha limbata* Giglio-Tos is closer to *Anaxarcha graminea* Stal in the following characters: (1) Shape of mesosoma (2) Denticulated forecoxal margin. (3) Hyaline costal area of forewing with parallel

venation, reticulated venation at the discoidal area. (4) Hindwing hyaline with pink cross veins. This species *A. limbata* Giglio-Tos differs from *A. graminea* Stal in the following characters: (1) Mesosomal border with black line in *A. limbata* (Mesosomal border without black line in *A. graminea*). (2) Longer internal spines of forefemur not black in *A. limbata* (Longer internal spines of forefemur black in *A. graminea*).

Genus *Euantissa* Giglio-Tos

Euantissa Giglio-Tos 1927. *Das Tierreich*. 50:540 Type species *Euantissa pulchra* (Fabricius)

Diagnostic characters:

Body medium, green. Vertex four lobed, without protuberance; eyes oblong; frontal sclerite transverse, narrow, with a median longitudinal furrow, superiorly widely arched. Mesosoma broad, little longer than forecoxa with no metazonal constriction, sides parallel, border denticulated; supra coxal dialation not pronounced; forefemur simple with 4 sharp long external and 4 discoidal spines; foretibial external spines compressed; middle and hind legs shorter, femora without any lobes; wings brightly coloured, longer than metasoma; forewing green and opaque; hindwing coloured with dark spots or patches.

Distribution: India, Bangladesh.

Two species are known from India.

Key to Indian species of *Euantissa* Giglio-Tos

- Hind wings with dark large spot.....*E. ornata* Werner
 - Hind wings with dark line along the outer border *E. pulchra* (Fabricius)

***Euantissa pulchra* (Fabricius)**

(Figs.52-58)

Mantis pulchra Fabricius 1787 *Mant. Ins.* 1 229 Type Hab. Tranquebariae.

Euantissa pulchra Giglio-Tos 1927 *Das Tierreich* 50 541.

Plesiotype: Female Body Length 23mm.

Colour: Green. Vertex earth brown; eyes wood brown with fuscous patches; ocelli ferruginous; flagellum earth brown with fuscous annulations, antennal scape, pedicel, frontal sclerite, clypeus, gena, forelegs, mid and hindlegs and metasoma concolorous with vertex, with slight green tinge; forewings moss green, anal membrane light orange; hindwings proximal area orange, distal peripheral border with thick black line.

Head: bluntly triangular, 1.2x wider than high; vertex without protuberance, thrown distinctly into five lobes; eyes oblong, emarginate; ocelli small, slanting; POL : OD : OOL = 6 : 1 : 5; antenna filiform, not too slender, short; frontal sclerite transverse, 5.6 x wider than high, placed perpendicular to superior shelf of clypeus, superior border sinuate, disc with lateral carina, inferiorly slightly arched; clypeus projecting with obtuse carina; labrum carinated.

Mesosoma: nearly as long as forecoxa, 2.1x longer than broad, without metazonal constriction, lateral sides runs parallel, denticulated, prozona spatulated; supra coxal dialation not pronounced; metazona 1.6x longer than prozona, with middorsal weak carina. Forelegs simple, coxa with outer longitudinal ridge, margin not denticulated, femur not foliaceous, outer margin straight, 1.15x longer than coxa, 2.5x longer than tibia, with 4 external, 4 discoidal, (the third one longest), 6 longer internal, 5 shorter internal spines, distal spines placed more wide apart than proximal ones; tibia with 12 small external, 11 longer internal spines; metatarsus slightly longer than all other tarsal segments together. Middle and hindlegs: middle legs slightly shorter than hindlegs, coxa short, femur slightly bulged at base, a little longer than tibia in hindlegs, a little shorter than tibia in middle legs, with apical spines; metatarsus as long as all other tarsal segments together. Wings longer than metasoma, forewings leathery, opaque, anterior radial vein (Subcostal) bifurcates distally, post radial (cubitus1) bifurcates, discoidal (cubitus 2) branches and rebranches, with densely reticulated veinlets; hindwings semi hyaline, anterior radial vein splits proximally.

Metasoma: fusiform, shorter than wings, anteriorly with middorsal carina; supra anal plate short. Cerci long, with pubescence.

Materials examined: Plesiotype: Female, INDIA: Kerala, Adivaram, 11-iv-2000, Mohana (DZCU). Other materials examined: 1 female, INDIA : Kerala, Vellayil, (Calicut), 21-xi-1999 , Janitha, 1 male INDIA :Kerala, Calicut, 4-viii-1998 , Vyjayandi, 2males INDIA :Kerala, Cali. Uni. Campus, 13-iii-2000, 12-xi-2000, Vyjayandi (DZCU).

Biology:Unknown

Habitat: Present at disturbed and undisturbed areas

Distribution: India : Kerala, Eastern and North Eastern India, Sri Lanka.

Discussion: This species *Euantissa pulchra* (Fabricius) is similar to *Euantissa ornata* Werner in the following characters: 1. Denticulate mesosoma. 2. frontal sclerite wider than high 3. Ornamental hindwings. This species *Euantissa pulchra* (Fabricius) differs from *Euantissa ornata* Werner in the following characters :1. The posterior constriction of metazona totally absent in *E. pulchra* (posterior metazonal constriction of metazona slightly present in *E. ornata*) 2 . Hindwing with outer border black in *E. pulchra* (hindwing with a large dark spot in *E. ornata*).

Genus *Hestiasula* Saussure

Hestiasula Saussure, 1871. *Mem. Soc. Phys. Hist. Nat. Geneva* 21:30

Type species *Hestiasula brunneriana* Saussure

Diagnostic characters:

Vertex usually with protuberance; frontal sclerite transverse, disc smooth. Mesosoma rhomboidal; forecoxa simple, internal apical lobes convergent; femur foliaceous, external edge smooth, disc with 2-3 rectangular black patches; middle and hind femora with insignificant triangular lobes.

Distribution: Asia, Tropical Oriental Region.

Key to Indian species of *Hestiasula* Saussure

- | | |
|---|-----------------------------|
| 1. Vertex with tubercle..... | 2 |
| - Vertex without tubercles..... | 5 |
| 2. Fore coxa internally black..... | 3 |
| - Fore coxa entirely yellow..... | <i>H. woodi</i> Giglio-Tos |
| 3. Forefemur with a black patch internally along upper edge
..... | <i>H. masoni</i> Giglio-Tos |
| - Forefemur with more than one patches internally along upper edge..... | 4 |

- 4. Forefemur with two black patches internally; all forefemoral spines entirely black.....*H. castetsi* (Boliver)
- Forefemur with three black patches internally; all forefemoral spines black at tips only*H. brunneriana* Saussure

- 5. Forecoxa yellowish brown.....*H. nigrofemorata* Werner
- Forecoxa black.....6

- 6. A black spot at claw groove.....*H. kasteneri* Beier
- A black patch from base of discoidal spine proceeding along superior border of forefemur.....*H. inermis* (Wood-Mason)

***Hestiasula brunneriana* Saussure**
(Figs.59-66) (Plate VI Fig.1)

Hestiasula brunneriana Saussure, 1871, *Mem.Soc.Phys.Hist.Nat.* Geneve 21: 330

Hestias brunneriana Saussure, 1872, *ibid*, v.23, p.83

Plesiotype: Male Body length 27 mm.

Colour: light earth brown. Head earth brown with scattered black brown spots and shades; spine of vertex dark brown, orange at tip; eyes wood brown with blackish brown streaks and patches; ocelli ferrugeneous with black border; antenna light brown; frontal sclerite light brown with indistinct dark brown scattered spots; clypeus and labrum earth brown with distinct fuscous tinge and dots. Mesosoma concolorous with head; carina on posterior metazona light brown; hairs on lateral half of metazona creamy brown; mesosternum earth brown with indistinct dark brown dots; forelegs: coxa glistening light brown; femur dorsally light brown with dark brown zig zag shading, not distinct and with three distinct black tubercles, ventrally glistening light brown, with three well pronounced roughly rectangular patches at superior border; all spines light brown with dark brown tips; tibia light brown, without any dark brown shade; tibial claw dark brown; metatarsus and other tarsal segments black; tarsal claw light brown with dark brown tip; middle and hind legs: earth brown with fuscous annulations except on coxa; apical spines of tibia brown, metatarsus and other tarsal segments light creamy brown. Costal area of forewing green, opaque, remaining part hyaline, anterior half dark brown with faint dark brown marking;

hindwing hyaline, dark brown along truncate margin. Metasoma and cerci earth brown.

Head: 1.4x wider than high, conical; vertex not flat, not smooth, centrally with a trapezoidal elevation, carrying a protuberance; lateral inferior margins of occiput bulging with pubescence; eyes oval, bulging ; ocelli large, closely placed; POL:OD:OOL = 5:4:14 ; frontal sclerite transverse, midsuperiorly spiniform, 1.4x wider than high, inferiorly arched ; clypeus with transverse and longitudinal carina.

Mesosoma: rhomboidal; supra coxal dialation spiniform laterally, disc 1.4x longer than wide; metazona constrict at middle, disc not smooth with 3-4 bosses, mid dorsally carinated, inferior and lateral borders of metazona indistinctly arched; sternum with post longitudinal furrow ; forelegs: coxa slender, simple, non granulated disc; coxal margin on inferior side with 2 spines proximally; femur foliaceous, superiorly sinuate and convex, 1.7x longer than wide, 1.2x longer than coxa, 1.8x longer than tibia, with 5 external, 3 discoidal, 6 internal longer, 6 internal smaller spines, external ones very small and equal sized, third discoidal longest, proximal internal spines closely distributed than distal ones; tibia 1.5x longer than metatarsus with 11 external and 11 internal spines, internal spines gradually elongate towards distally; tibia and metatarsus sparsely scetaceous ; middle and hind legs: coxa stouter, femur slender with a distal ventral small lobe, more pronounced in hind femur than the mid femur; hind femur 2x longer than coxa, equal in length with tibia; tibia 1.5x longer than metatarsus; both legs setaceous ; wings semi hyaline; forewings costal area opaque,

slightly iridescent, without any marginal hairs; both wings truncate, forewing with anterior radial vein and anterior ulnare veins bifurcate.

Metasoma: fusiform; supra anal plate oblong, shorter, sternum with 3-4 triangular projections, with pubescence; cerci short.

Material examined: Plesiotype: Male: INDIA, Kerala, Thamarassery (Kozhikode dist), 11-iii-99, Vyjayandi (DZCU). Other materials examined: 1 Male, INDIA, Kerala, Cali.Uni.Campus, 7-iv-98, T.C.Narendran; 1Male, Cali. Uni. Campus, 11-iii-99, Raji B(DZCU). INDIA, Kerala, Nilambur, 23-i-96; C.D Sebastian, (DZCU) ,1Male, India, Kerala,Thrissur 11-i-98, Vyjayandi(DZCU), 1Female , INDIA, Kerala, Alappuzha,12-v-95, Sheela(DZCU), 1Female, INDIA Kerala, Kuttiadi, 5-viii-2001, Vyjayandi,(DZCU).

Biology: Unknown.

Habitat: Undisturbed

Distribution: India, Kerala, Andhra Pradesh, West Bengal, Meghalaya, Srilanka.

Discussion: This species *Hestiasula brunneriana* Saussure is closely related to *H.castetsi* Boliver in the following characters: 1. Frontal sclerite with a conical projection. 2. Foliaceous femur 3. Rhomboidal mesosoma with borders setaceous, linear carina. This species *H.brunneriana* Saussure differs from *H.castetsi* Boliver in the following characters: 1. Superior border of fore femur with 3 black

subrectangular patches in *H.brunneriana* (with 2 patches in *H.castetsi*); 2. anterior femur interiorly not black at base in *H.brunneriana* (anterior femur interiorly black at base in *H.castetsi*) 3. Forecoxa internally not black in *H.brunneriana*, but glossy brown (forecoxa internally entirely black in *H.castetsi*) .

Subfamily Hymenopodinae

Body medium sized. Vertex with protuberance above median ocelli; eyes conical, projects above the circumference of head, ocelli prominent; frontal sclerite excavated or depressed at centre, laterally with wing like extensions; superior margin with two small spiniform structures on either side of excavation. Mesosoma rhomboidal, shorter than forecoxa; supra coxal dialation and metazonal constrictions well pronounced; forecoxa with spines on the internal margin, internal apical lobes converging; fore femur with 4 external and 4 discoidal spines ; middle and hind legs long; femur with distal ventral lobes.

Two genera are known from India.

Key to genera

- Middle and hind femora with ventral distal lobe.....*Creobroter* Audinet- Serville
- Middle and hind femora with ventral lobe along the entire length
*Hymenopus* Audinet- Serville

Genus *Creobroter* Audinet- Serville

Harpas (Creobroter) Audinet -Serville 1839. *Hist. Nat. In. Orth.* P.160.

Type species *Creobroter discifera* (Audinet-Serville)

Creobrotra Saussure 1869. *Mitt. Schweiz. Entomol. Ges.* 3:59.

Diagnostic characters:

Body green. Vertex with protuberance; eyes conical, extending beyond circumference of head; vertex extend above eyes; frontal sclerite with squarish excavation at centre, laterally winged, bicarinate. Mesosoma short, saddle shaped; supra coxal dialation well pronounced; metazona constricted in middle ; forelegs coxa inner margin tuberculated; femur simple with 4 external and 4 discoidal spines; middle and hindlegs: long, femora with distal ventral lobe; both wings longer than metasoma, forewing green with yellow markings; hindwings coloured in female.

Distribution: Asia, Oriental Region, America.

Six species are known from India.

Key to Indian species of *Creobroter* Audinet-Serville

1. Forewing with eye-spot in the middle2
 - Forewing with eye-spot in front of middle3

2. Base of forewing with yellow spot in male *C. apicalis* Saussure
 - Base of forewing without yellow spot in male..... *C. urbanus* (Fabricius)

3. Eye spot encloses black spots4
 - Eye spot does not enclose black spots..... *C. species. A.*

4. Fore wing with anal membrane black..... *C. laevicollis* (Saussure)
 - Forewing with anal membrane not black.....5

5. Body more robust, smokey patch of hindwing large..... *C. elongata* Beier
 - Body less robust, smokey patch of hindwing small..... *C. gemmatus* (Stoll)

***Creobroter apicalis* Saussure**

(Figs.67-72) (Plate V Fig.4)

Creobrotra apicalis Saussure 1869 *Mitt. Schweiz. Entomol. Ges.* 3 73

Holotype India.

Crebroter apicalis Giglio-Tos 1927 *Das Tierreich* . 50 558.**Plesiotype:** Female Body Length 37 mm.

Colour: green with yellow spot on forewing. Vertex yellow with light green spike; eyes black; ocelli orange; antenna fuscous; frontal sclerite, clypeus, labrum, mesosoma, legs and metasoma yellow with green tinge. Forefemur with three green annulations, all spines black at tips only; forewing green with an yellow patch at the middle bordered by black eye like marking, a black dot at the yellow area, costal area yellow; hindwing pink proximally, middle black, transparent distally.

Head: trapezoid, 3.18x wider than high, vertex not smooth, with middorsal spine, lateral lobes prominent, squarish; eyes conical, projecting upwards; antenna slender, filiform; ocelli conspicuous, median ocellus conical, lateral ones slanting. POL: OD : OOL = 4 : 1: 6 ; frontal sclerite centrally with an excavated trapezoid area , laterally with two wing like extensions, superior border arched with two projections.

Mesosoma: saddle shaped, shorter than forecoxa, supra coxal dialation well pronounced, 1.6 x longer than wide at supra coxal dialation, 4.5 x longer than wide at metazonal constriction; prozona spatulate, laterally denticulated, with central indistinct carina, metazonal constriction well pronounced, nearly 1.5 x longer than prozona. Forelegs: coxa triangular dorsally with 8-9 obtuse marginal spines, middorsal carina with spines, internal apical lobes converging; femur 1.2x longer than coxa, 1.5x longer than tibia, with 4 external, 4 discoidal,(third longest and stoutest, 3x longer than second, first spine the smallest) with six longer internal and seven shorter internal spines, two distal longer internal spines enclose two shorter spines, distal spines widely distributed than proximal ones, tibia with 16-17 smaller, depressed external, 14 longer internal closely arranged spines; metatarsus as long as all other tarsal segments together. Middle and hind legs: middle legs a little longer than hindlegs, mid femur twice as long as mid tibia, with semicircular, distal ventral lobe, with two genicular spines; tibia with three distal genicular spines; metatarsus and other tarsal segments with small setae. Wings: both wings longer than metasoma, costal and anal areas of forewing transparent, other parts semiopaque, anterior radial vein bifurcate distally, posterior radial vein trifurcates proximally, border not ciliated; hind wings transparent, posterior radial vein bifurcates twice, all other veins run parallel, with rectangular cross veins.

Metasoma fusiform, posteriorly a little broader, cerci many segmented, with pubescence.

Biology: Unknown.

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VYJ/S

Habitat: Undisturbed

Distribution: India, Kerala, Karnataka, Assam, Meghalaya, Manipur, Sikkim, West Bengal.

Materials examined: Plesiotype: female, INDIA, Kerala, Cali.Uni.Campus. , 22-v-2000, Rajesh. K. P (DZCU). Other materials examined: 1Female, INDIA, Kerala, Cali.Uni.Campus., 16-vii-99, Bindu S.T. (DZCU). 1Female, INDIA, Kerala, Cali. Uni. Campus, 7-xi-97, Jayakrishnan (DZCU). 1Female, INDIA, Kerala, Cali. Uni. Campus, 5-ix-96, Koya M (DZCU). 1Female, INDIA, Kerala, Cali. Uni. Campus, 2-ii-2000, Sinu (DZCU). 1Female, INDIA, Kerala, Cali. Uni. Campus, 16-vii-99, Sajitha (DZCU). 1Female, INDIA, Kerala, Malaparamba, 24-ix-2000, Sreekala (DZCU). 1Female, INDIA, Kerala, Koyilandy, 7-ii-2000, Shabna (DZCU). 1Female, INDIA, Kerala, Malaparamba, 18-iii-98, Vyjayandi (DZCU). 1Female, INDIA, Kerala, Koor, 6-v-99, Vyjayandi (DZCU). 1Female, INDIA, Kerala, Mukkali, 5-xi-98, Sandhya. 1Female, INDIA, Kerala, Narikkuni, 28-viii-2000, Sajina (DZCU). 1Female, INDIA, Kerala, Kannur, 14-vi-99, Vyjayandi. 1Female, INDIA, Kerala, Pulloorampara, 11-iv-2000, Sojan (DZCU). 1Female INDIA, Kerala, Calicut, 8-i-2001, Beena (DZCU). 1Female, INDIA, Kerala, Thottipalam, 7-v-2000, Sohini (DZCU). 1Female, INDIA, Kerala, Kannur, 14-vi-99, Vyjayandi (DZCU). 1Female, INDIA, Kerala, Vadagara, 11-ix-98, Seena (DZCU). 1Male, INDIA, Kerala, Thrissur, 2000, Usha K (DZCU). 1Male, INDIA, Kerala, Kannur, 7-xi-98, Sreena (DZCU). 1Male, INDIA, Kerala, Nilambur, 6-VI-99, Joshila (DZCU). 1Male, INDIA, Kerala, Chavassery, 3-iv-2000, Anitha K (DZCU). 1Male, INDIA, Kerala, Malaparamba, 26-iv-2000, Vyjayandi (DZCU). 1Male, INDIA, Kerala, Cali. Uni. Campus, 11-v-99, Priya Menon (DZCU).

1Male, INDIA, Kerala, Cali. Uni. Campus, 12-v-97, Sunitha (DZCU). 1Male, INDIA, Kerala, Koyilandy, 16-ii-99, Rekha (DZCU). 1Male, INDIA, Kerala, Periyar Tiger Reserve (Idukky), 11-xi-96, Sureshan. P. M (ZSI Calicut, Reg. No. 9591).

Discussion: This species *Creobroter apicalis* Saussure is closely related to *Creobroter urbanus* Fabricius in the following characters: 1. Presence of spine on vertex. 2. Frontal sclerite excavated appearance at middle, on either side with wing like extensions. 3. Mid and hind femur with semi circular ventral lobe. This species *C. apicalis* Saussure is different from *C. urbanus* Fabricius in the following characters: 1. Eye spot on the fore wing placed in the middle in *C. apicalis* (Eye spot placed proximal to middle of forewing in *C. urbanus*). 2. Base of the fore wing with two round yellow spot in *C. apicalis* (Base of forewing without any yellow spot in *C. urbanus*).

FAMILY MANTIDAE

Diagnostic characters:

Body small to large size. Antenna long, weakly setaceous or non setaceous; eyes globular or conical, with or without spines; frontal sclerite transverse. Forelegs simple, forecoxa with or without marginal spines; forefemur internally one longer spine alternates with one shorter spine. Mid and hindlegs with or without lobes. Wings never truncate round at tip. Cerci simple or foliaceous.

There are fourteen subfamilies reported from India.

Key to subfamilies of Mantidae

1. Mesosoma broad, disc like (Fig. 124).....2
- Mesosoma elongated (Fig 135).....5

2. Body large; eyes less prominent ; mesosoma (Fig.252) much dialated;
 anterior crypt of prozona conceals the head (extra limital).....Choeradodinae
- Body small to medium sized; eyes prominent,mesosoma not much
 dialated(Fig.76); anterior crypt of prozona not concealing head.....3

3. Body medium sized, bark coloured; in males wings longer than
 metasoma; females shorter.. Liturgusinae

- Body small sized; brown or testaceous; wings longer than metasoma
in both sexes.....4
- 4. Antenna thinner, with sparse setae, one at a segment, wings iridescent,
wing border and surface never setaceous..... Iridopteryginae
- Antenna thick, with rosettes of bristles at the junction of each segment
wings not iridescent, bordered with sharp setae, entire surface of wings
setaceous.....Amelinae
- 5. Forefemur with 4 external, 4 discoidal spines; body slender (Fig.101,97).....6
- Forefemur with 4 to 7 external, 1 to 3 discoidal spines; body large to
bizzare shaped.(Fig221,225).....9
- 6. Eyes flat; mesosoma as long as or a little longer than forecoxa, foretibia with 6 to 8
external spines (Fig.101)..... Caliridinae
- Eyes not flat, conical; mesosoma much longer than forecoxa; foretibia with more
than 8 spines (Fig.231).....7
- 7. Eyes with spine; mid and hind legs shorter.....Oxythespinae
- Eyes without spine; mid and hind legs long.....8
- 8. Median apical lobes of forecoxa expanded, larger than laterals; mid and hind legs
long and slender(Fig.227).....Thespinae

- Median apical lobes of forecoxa not expanded; mid and hind legs not slender (Fig.132).....Mantinae

- 9. Mesosoma depressed; eyes conical or elongated;head bifid in appearance (Fig.222)..... 10
 - Mesosoma well developed; eyes globular; head not bifid in appearance(Fig235)..... 13

- 10. Antenna thick at base(Fig.222); body stick-like and elongated; vertex not much elongated..... Schizocephalinae
 - Antenna slender; head with vertex much elongated(Fig.253)..... 11

- 11. Middle and hind legs with lobular extension; foretibia not compressed.....12
 - Middle and hind legs without lobular extension; foretibia more or less compressed..... Tarachordinae

- 12. Mesosoma with leaf like expansion (extralimital).....Deroplatinae
 - Mesosoma without leaf like expansion(extralimital).....Phyllothelinae

- 13 Brownish insects, metazona strongly carinated ; forefemur without carina between rows of external and internal spines, mid and hind legs with lobular extensions..... Toxoderinae

- Green insects; metazona without carina; forefemur with carina between rows of external and internal spines; mid and hindlegs without lobulations
(extra limital).....Photinae

Subfamily Amelinae

Body small; head thick; eyes globular; ocelli conspicuous; frontal sclerite trapezoid; antenna thick, long with rosettes of bristles at the junction of two segments. Mesosoma short; shorter than forecoxa, rhomboidal ; forelegs simple, forefemur anterior portion dilated, with 4 external and 4 discoidal spines; disc between row of external and internal spines denticulated; wings longer than metasoma; surface and border setaceous. Metasoma fusiform, supra anal plate short.

Only one tribe is known from India.

Tribe Amelini.

Eight genera are known from India.

Key to genera

1. Fore metatarsus longer than all other tarsal segments together.....2
 - Fore metatarsus not longer than all other tarsal segments together.....7

2. Frontal sclerite as high as wide (Fig.75).....*Amantis* Giglio-Tos
 - Frontal sclerite not as high as wide(Fig.86).....3

3. Frontal sclerite bicarinate*Cimantis* Giglio-Tos
 - Frontal sclerite not bicarinate.....4

4. Frontal sclerite transverse, superior margin angular.....*Gimantis* Giglio-Tos
 - Frontal sclerite transverse with superior margin not angular.....5

5. Frontal sclerite superior margin arched..... *Gonypeta* Saussure
 - Frontal sclerite superior margin sinuate.....6

6. Foretibia with 10-11 external spines*Elmantis* Giglio-Tos
 - Foretibia with 9 external spines.....*Eumantis* Giglio-Tos

7. Elytra of female shorter than metasoma; margin of vertex extends beyond
the circumference of eye.....*Memantis* Giglio-Tos
 - Elytra of female not shorter than metasoma; margin of vertex confluent with
eyes.....*Gonypetyllis* Wood-Mason

Genus *Amantis* Giglio-Tos

Amantis Giglio-Tos. 1915. *Bull.Soc. Entamol. Ital.*46:151. Type species

Amantis reticulata(Deltaan)

Diagnostic characters:

Body very small; eyes prominent; ocelli conspicuous; antenna thick and bristled; frontal sclerite as wide as high, superior border truncate; carina indistinct. Mesosoma short rhomboidal with black stripe extending upto head; metazona a little longer than prozona; forefemur dialated with 4 external and 4 discoidal spines; metatarsus longer than all other tarsal segments together; middle and hind legs much longer; wings longer than metasoma.

Distribution: Asia, Oriental region

Six species are known from India.

Key to Indian Speciesof *Amantis*

- | | |
|--|---|
| 1. Frontal sclerite with black spot..... | 2 |
| - Frontal sclerite without black spot..... | 3 |

2. Mesosoma entirely black with a discontinuous stripes in black
*A. biroi* Giglio-Tos
- Mesosoma with a dark median line.....*A. saussurei*(Boliver)
3. Forefemur black, mid and hind coxa not black.....4
- Forefemur brown, mid and hind coxa black.....*A. malabarensis* sp. nov
4. Forelegs with second tarsal segment brown.....5
- Forelegs with second tarsal segment black.....*A. subirina* Giglio-Tos
5. Forefemur with 2-3 black dots internally.....*A. bolivarii* Giglio-Tos
- Forefemur with 3 indistinct bands.....*A. indica* Giglio-Tos

***Amantis malabarensis* sp. nov.**

(Figs.73-79)

Holotype: Male. Body length 14mm.

Colour: Black with orange tinge. Head: Colour of dried leaves; central area of vertex jet black, either side clay brown with fuscous tinge; eyes brown to glossy fuscous; ocelli orange brown; frontal sclerite and clypeus concolorous with ocelli. Mesosoma concolorous with vertex; mesosternum black posteriorly, anteriorly black with testaceous tinge; forecoxa and forefemur concolorous with frontal sclerite; spines black at apex only; tibia jet black with slight testaceous tinge; metatarsus jet black;

other tarsal segments testaceous; middle and hind coxa jet black ; femur, tibia, metatarsus and other tarsal segments testaceous. wings testaceous to black, semi hyaline, with smokey stiff hairs; Metasoma jet black.

Head: Thick, broadly triangular, 1.6x wider than high; vertex with five insignificant lobes; eyes globular, ocelli large, conspicuous; POL:OD:OOL = 2:1:2; frontal sclerite pentagonal, almost as wide as high, angular superiorly, slightly arched inferiorly, not carinated, disc flat; clypeus projecting; antenna thick, with rosettes of sharp bristles at the junction of two segments.

Mesosoma: a little shorter than fore coxa, rhomboidal, supra coxal dialation pronounced; metazona constricted at middle, disc smooth with insignificant carina; 1.4 x longer than broad at supra coxal dialation; metazona 1.2x longer than prozona, margin setaceous; forelegs simple, not foliaceous; coxa with mid dorsal carina; margin with hairs; femur with 4 external, 4 discoidal and 12 internal (6 long and 6 short) spines; disc between rows of external and internal spines denticulated, 1.3x longer than coxa, 1.9x longer than tibia; tibia 1.4x longer than metatarsus with 11 external and 11 internal spines; metatarsus slightly longer than all other tarsal segments together; middle and hind legs: middle leg shorter than the hind leg; femur as equal as tibia; tibia more setaceous than femur; hind metatarsus a little longer than the other tarsal segments together; wings semihyaline, setaceous on surface and border, fore wings costal area opaque, costal vein setaceous, veinules with broad spaces ,

anterior and posterior radial veins not bifurcating , discoidal vein bifurcate distally; hind wings anterior vein bifurcates and posterior radial vein trifurcates.

Metasoma: Shorter than wings, stout, fusiform; supra anal plate short; posterior part subconical; cerci short, segmented, posterior part with pubescence.

Materials examined: Holotype: Male. India, Kerala, Kovoov(Calicut) 21-v-2000, Vyjayandi (DZCU). Paratypes. 3 males, Kerala. Malaparamba(Calicut) 18-ii-2000, Vyjayandi, (DZCU) Kerala, Malaparamba, 21-iii-99, Grace, (DZCU), Calicut University campus 5-x-2001, Vyjayandi (DZCU).

Biology: Unknown

Habitat: found at disturbed areas

Discussion: This species *Amantis malabarensis* sp.nov is closely related to *Amantis biroi* Giglio-Tos in the following characters: 1. Mesosoma , forewing and veins black. This species *Amantis malabarensis* sp.nov differs from *Amantis biroi* Giglio-Tos in the following characters. 1. Frontal sclerite without black spot in *Amantis malabarensis* sp.nov (frontal sclerite with black spot *A.biroi*) and 2. Mesosoma with continuous black stripe with *A.malabarensis* sp.nov (mesosoma with discontinuous black stripe in *A.biroi*).

A. malabarensis sp. nov. resembles *A. bolivarii* Giglio-Tos in the following characters :
1. Frontal sclerite without any black stripe. 2. Mesosoma with median black stripe. 3. Wings subhyaline. This species *Amantis malabarensis* sp.nov differs from *A.bolivarii* Giglio-Tos in following features 1. Forecoxa internally without black spot in *A.*

malabarensis sp. nov. (forecoxa internally with black spot in *A. bolivarii*). 2. Forefemur without any black dots internally in *A. malabarensis* sp. nov. (forefemur internally with 2-3 dots in *A. bolivarii*).

Amantis malabarensis sp.nov. is related to *Amantis indica* Giglio-Tos in the following characters: 1. Frontal sclerite without any black patch. 2. Mesosoma with a black stripe. 3. Foremetatarsus black, other tarsal segments brown. This species *A. malabarensis* sp. nov. differs from *A. indica* in the following character: 1. Forefemur not black, without any indistinct black bands in *A. malabarensis* sp. nov. (forefemur black, with 3 indistinct bands in *A. indica*).

Amantis malabarensis sp.nov. is related to *Amantis saussurei* Bolivar in the following characters: (1) vertex dorsally blackish (2) Mesosoma with a dark median line. *Amantis malabarensis* sp.nov. differs from *Amantis saussurei* Bolivar in the following characters: (1) Frontal sclerite without black dots in *A. malabarensis* sp. nov. (Frontal sclerite with two black spots on either side in *A. saussurei* Bolivar) (2) First fore tarsal segment black in *Amantis malabarensis* sp.nov. (First tarsal segment brown in *A. saussurei*)

Amantis malabarensis sp.nov. is similar to *Amantis subirina* Giglio-Tos in the following characters: (1) Frontal sclerite without any black spot. (2) Mesosoma with median black stripe (3) Forecoxa brown. *Amantis malabarensis* sp.nov. differs from *Amantis subirina* in the following characters: (1) Vertex with median black stripe in *Amantis malabarensis* sp.nov. (without any black stripe in *A. subirina*) (2) Forelegs femur brown in *Amantis malabarensis* sp.nov. (forefemur black with three indistinct

bands in *A.subirina*) (3) Second tarsal segment not black in *Amantis malabarensis* sp.nov. (second tarsal segment black in *A.subirina*).

Genus *Cimantis* Giglio-Tos

Cimantis Giglio-Tos. 1915. *Bull.Soc.Entomol.Ital.* 46:154. Type Species: *Cimantis fumosa* Giglio-Tos.

Diagnostic characters:

Body small, brown; head thick; eyes globular, bulging; antenna thick, long with rosettes of bristles between two flagellar segments; frontal sclerite transverse, flat, bicarinate. Mesosoma rhomboidal, shorter than forecoxa; forelegs: coxa simple; femur a little dilated, with 4 external and 4 discoidal spines; tibia with 9 external spines. Metasoma fusiform; supra anal plate short and triangular.

Distribution: Oriental region.

Three species are known from India.

Key to Indian species of *Cimantis* Giglio-Tos

1. Carina of frontal sclerite formed by the fusion of two tubercles (Fig.81);
body testaceous *C.testacea* Werner
- Carina of frontal sclerite not formed by the fusion of tubercles , distinct

- and longitudinal (Fig.86); body grey to black.....2
2. Wings fuliginous (grey); costal area of fore wing rather broad; mid and hind legs not triannulated.....*C. fuliginosa* Werner
- Wing smokey, costal area of fore wing not so broad; mid and hind legs with triannulation.....*C. fumosa* Giglio-Tos

***Cimantis testacea* Werner**

(Figs.80-85)

Cimantis testacea Werner 1931 *Proc.Zool.Soc.London* 1931:1330

Holotype: Male. India , Darjeeling, Teesta Valley, 700ft(BMNH)

Plesiotype: Male Body length 17mm.

Colour: Creamy yellow with testaceous and fuscous patches. Vertex clay brown with fuscous patches, patches intense mid dorsally ; eyes glossy fuscous; ocelli lemon yellow with black fringe; frontal sclerite, labrum, forelegs, middle and hind legs and metasoma concolorous with vertex; antenna: scape yellowish brown, pedicel fuscous, flagella fuscous with clay yellow annuli; foretibia with fuscous triannulation, all spines black at tips only; wings light brown, semihyaline, veins fuscous; setae slightly iridescent.

Head: Vertex smooth, convex dorsally, lateral most lobes more conspicuous, 1.6x wider than high; frontal sclerite flat, smooth and bicarinate; carina formed by fusion of tubercles, 1.3x broader than high; superior border arched, slightly sinuate, inferior border slightly concave; eyes globular, projecting laterally; emarginate; ocelli large, closely placed. POL:OD:OOL = 19:7:16 ; antenna thick, longer with rosettes of bristles at junction of each segment.

Mesosoma short, rhomboidal, supra coxal dialation well pronounced with concave sides; disc not smooth, thrown into bosses; prozona with swollen elevation; metazonal constriction well marked; 1.4x longer than broad at supra coxal dialation and 2.6x longer than broad at metazonal constriction; metazona 1.6x longer than prozona; with sparsely distributed hairs laterally; with a longitudinal median furrow .
Forelegs: coxa without any spines; slightly broad; internal apical lobes contiguous, dorsal surface denticulated slightly; ventral surface smooth; trochanter broad, well pronounced, setaceous; femur broader than coxa, slightly dialated, superior margin straight with 4 external, 4 discoidal (third largest), 6 longer internal and 6 shorter internal spines; distally 2 longer spines enclosing two shorter ones; space between rows of external and internal spines denticulated; forefemur 1.3x longer than coxa and 1.4x longer than tibia; tibia 1.3x longer than metatarsus, with 9 smaller external spines and 11 gradually elongating internal spines; metatarsus twice long as all other tarsal segments together, setaceous; middle and hind legs elongated, densely setaceous; coxa broad, short; femur elongated, slightly longer than tibia, tibia 1.7x longer than

metatarsus; metatarsus slightly longer than all other tarsal segments together; wings testaceous, reaching far beyond tip of metasoma; costal area broad, with oblique broader veinules meshes; costal vein not reaching far beyond middle of wing; posterior radial vein bifurcates; in hindwing discoidal vein bifurcates, veinlets form broader meshes.

Metasoma smaller, slender, fusiform, supra anal plate short, broadly triangular with pubescence; cerci four segmented with pubescence.

Materials examined: Plesiotype: Male, India, Kerala, Nelliampathy (920Mts above sea level)(Palakkad), Vyjayandi, 9-iv-2001(DZCU)

Distribution: India, Kerala, Tamil Nadu (Tropical rain forests)

Biology: Unknown; fast runner.

Habitat: Seen in undisturbed tropical rain forests.

Discussion: This species *Cimantis testacea* Werner is closely related to *Cimantis fuliginosa* Werner in the following characters: 1. Small and slender body. 2. Frontal sclerite with fused tubercles forming bicarina 3. Antenna thick and setaceous. 4. Femur slightly dilated claw groove in the middle. 5 Mesosoma rhomboidal with sharp middle constriction. This species *Cimantis testacea* Werner differs from *Cimantis fuliginosa* Werner in the following characters: 1. Body testaceous in *Cimantis testacea* Werner (Body blackish in *C. fuliginosa* Werner). 2. Carina of frontal

sclerite in the form of 2 groups of tubercles in *C. testacea* (Carina of frontal sclerite continuous in *C. fuliginosa*).

***Cimantis fuliginosa* Werner**

(Figs.86-90)

Cimantis fuliginosa Werner 1931 *Proc. Zool. Soc. London* 1330

Holotype M: India Tamil Nadu Annamalai Hills , 2400 ft. (BMNH)

Plesiotype: Female Body Length 15 mm.

Colour: Testaceous with grey tinge. Vertex testaceous with three fuscous patches, central one more prominent; eyes fuscous; ocelli ferruginous with black border; antenna : scape and pedicel testaceous, flagella with fuscous annulations; frontal sclerite, clypeus, labrum, mesosoma, metasoma testaceous with fuscous tinge; legs testaceous, all spines of forefemur black at tips only; wings brown with grey tinge, veins fuscous.

Head: 1.7x wider than high, vertex lobbed; eyes globular; ocelli large, conspicuous, POL:OD:OOL=2:1:2; antenna thick, flagellar segments squarish with sharp rosettes of bristles at junctions; frontal sclerite 1.5x wider than high,

superior border arched in center, laterally sinuate, slightly concave inferiorly ;
 clypeus squarish; labrum globular.

Mesosoma: short, rhomboidal, as long as forecoxa with well pronounced supra coxal dialation and metazonal constriction; prozona oval, metazona with three anterior lateral bosses, 1.4x longer than prozona ,inferior end semicircular. Forelegs simple; coxa as long as femur, with mid dorsal ridge, hairy, internal apical lobes divergent; trochanter slightly swollen , with a row of hairs; femur slightly dialated at base, with wide ventral denticulated gap, 1.6 x longer than tibia, superior border slightly sinuate, outer surface with two grooves, with 4 external, 4 discoidal (second and third longer), internally 6 long, 6 short spines (distal two longer internal spines enclose two short spines), claw groove proximally placed; tibia hairy, with 8 external, 11 internal spines, slightly longer than metatarsus, metatarsus hairy , as long as all other tarsal segments together; mid and hind legs hairy; coxa short; midleg slightly shorter than hindleg; midfemur slightly longer than midtibia; midtibia with apical spines ,midmetatarsus slightly all other tarsal segments together; wings much longer than metasoma, hairy, semi opaque;in forewings anterior radial and posterior radial veins bifurcates; in hindwings anterior radial vein trifurcates, postradial vein bifurcates, veinlets broad.

Metasoma: fusiform, hairy, supra anal plate short, triangular; cerci short.

Material examined:Plesiotype:India ,Kerala, Silent valley, Binoy, 26-vii-1995 (DZCU).

Biology: Unknown

Habitat: at high altitudes; undisturbed Tropical Rain forest

Distribution: India,(Kerala, Tamil Nadu).

Discussion:This species *Cimantis fuliginosa* Werner is closely related to *Cimantis testacea* Werner in the following characters :1. Small and hairy body. 2. Thick and bristled antenna 3. Short and rhomboidal mesosoma 4.Wings much longer than metasoma. However this species *Cimantis fuliginosa* Werner differs from *Cimantis testacea* Werner in the following characters 1. Frontal sclerite arched midsuperiorly, disc with two continuous carina in *C.fuliginosa* (frontal sclerite midsuperiorly truncate disc with discontinuous carina in *C.testacea*. 2 Wings slightly greyish brown in *C. fuliginosa* (wings testaceous in *C. tetacea*.)

Genus *Elmantis* Giglio-Tos

Elmantis Giglio-Tos. 1915. *Bull.Soc.Entomol. Ital.*46:161 Type species *Elmantis trincomaliae*(Saussure).

Diagnostic characters:

Body small, earth brown; head with 4 lobes; eyes prominent, bulging; frontal sclerite transverse, superior edge sinuate, lateral edges angular; antenna thick with rosettes of bristles between flagellar segments. Mesosoma rhomboidal, disc not

smooth, with bosses; metazona constricted posteriorly; forecoxa simple, femur a little dilated, with 5 external first two proximal spines closely placed), 4 discoidal spines; tibia with 10 external spines; wings semihyaline, setaceous (both on surface and border); post metatarsus longer than all other tarsal segments together; wings longer than metasoma; metasoma fusiform; cerci short.

Distribution: Oriental region .

***Elmantis trincomaliae*(Saussure)**

(Figs.91-96)

Gonypeta trincomaliae Saussure 1869 *Mitt. Schweiz Entomol. Ges.* 3:63. Type

Sri Lanka.

Elmantis trincomaliae Giglio-Tos 1915 *Bull. Soc. Entomol. Ital.* 46:161

Plesiotype: Male Body length : 22 mm.

Colour: Light brown with dark brown dots. Vertex earth brown with fuscous dots on either side of central light brown line; eyes fuscous; ocelli ferruginous with outer border black; frontal sclerite, clypeus, and labrum concolorous with vertex; antennal scape, pedicel and flagella light brown; flagella darker towards apex. Mesosoma earth brown with irregular markings, border with black elevated spots; mesosternum with dark brown median spot; forelegs: concolorous with mesosoma;

femur with 3-4 dark brown patches superiorly; tibia with dark brown triannulations; all spines black at tips only, except internal spines of foretibia which are entirely black; metatarsus with two dark brown bands; middle and hind legs : coxa light brown with dark brown dots; femur, tibia and tarsal segments light brown; claws and preapical spines of tibia testaceous. Forewings semi hyaline, clay brown; costal area with more brown spots than discoidal area; veins light brown with blackish brown patches along the entire length; hindwings hyaline, veins dark brown with dull brown setae. Metasoma concolorous with mesosoma, pubescence iridescent.

Head: Thick, triangular, 1.6x wider than long, not smooth, thrown into four lobes; eyes round, bulging laterally; ocelli conspicuous, large, POL:OD:OOL = 6:8:15; antenna filiform with rosettes of bristles at junction of two segments; frontal sclerite trapezoid, superior margin truncate medianly, concave laterally; disc 2x wider than high; clypeus carinate midlongitudinally.

Mesosoma: rhomboidal, a little longer than forecoxa; supra coxal dialation well pronounced and narrows posteriorly; 1.5x longer than broad at supra coxal dialation and 2.5x longer than broad at lower narrower area; carinate in the middle, disc not smooth, with 4 denticulated bosses on either side of central carina; prozona oval with two triangular bosses on lower side; metazona 1.3x longer than prozona. Forelegs: coxa with carina on outer and inner border; middorsally concave, with sparsely distributed hairs, ventral side bulging with minute denticles; internal apical lobes divergent; forefemur broad, arched superiorly, claw groove at base with 5

external (proximal first and second closely packed), 4 discoidal spines (first very small, third longest), internally with 6 longer and 6 shorter spines; proximal spines closely placed than distal ones; 1.5x longer than coxa; 1.9x longer than tibia; tibia with 10 very small external and 9 longer internal spines, 1.2x longer than metatarsus; metatarsus as equal as all other tarsal segments together; middle and hind legs slender, elongated; coxa short and broad; femur 2.1x longer than coxa and 1.3x longer than tibia; tibia 2.5x longer than metatarsus; metatarsus as equal as all other tarsal segments together; femur and tibia with apical spines, with fine pubescence. Wings: both wings longer than metasoma; forewing semihyaline with setaceous outer border; costal area more opaque than discoidal area; costal vein not reaching distal tip of forewing; anterior radial vein bifurcates at middle; hind wing more hyaline, discoidal vein trifurcates.

Metasoma: fusiform with pubescence; supra anal segment short; cerci short.

Materials examined: Plesiotype: Male, INDIA, Kerala, Kovoov, 5-iii-2000, Vyjayandi (DZCU). Other materials Examined: 1Female,INDIA, Kerala, Kovoov, 3-ii-2000, Vyjayandi (DZCU), 1 male, INDIA, Kerala, Kovoov, 5-ix-1998, Vyjayandi (DZCU), 1 male, INDIA, Kerala, Kottakkal, 17-iv-2001, Vyjayandi (DZCU) 1 male, INDIA, Kerala, Malaparamba, 27-iv-2000, Vyjayandi, (DZCU), 1 male, INDIA, Kerala, Malaparamba, 7-ii-2000, Vyjayandi, (DZCU), 1 male, INDIA, Kerala, Malaparamba, 12-ix-2000, Sheela, (DZCU), 1 female, INDIA, Kerala, Thalipadavu(Kasargod), 27-xi-

1995, Anitha V. K (DZCU), 1female, INDIA, Kerala, Ernakulam, 26-viii-2001, Madhavikkutty, (DZCU).

Biology: There is not much distinction between male and female externally; ootheca is small, about 1 cm in diameter. Within 1 week, about ten to twelve nymphs emerge out. Young ones are with white and fuscous bands.

Habitat: Usually seen at human inhabitations; moves fast .

Distribution: India, Kerala, Tamil Nadu, Sri Lanka.

Discussion: *Elmantis trincomaliae* (Saussure) differs from *Elmantis nira* Mukherjee and Hazra only in one character. In *E.trincomaliae* (Saussure), the foretibia is with 10 external spines whereas in *E. nira* it is with 11 spines. It is quite likely that *E. nira* may be a junior synonymn of *E. trincomaliae* (Saussure) and the difference of numbers of external spines of foretibia as 10 and 11 represents only variation.

Subfamily Caliridinae

Body slender. Vertex not prolonged; eyes not protruding; antenna slender. Mesosoma as long as forecoxa; internal apical lobes of forecoxa divergent; forefemur with 4 external, 4 discoidal spines; tibia with 6 to 7 external spines.

Two genera belonging to this subfamily

Key to Genera

- Discoidal spines of forefemur arranged in a row; foretibia with six external
 Spines.....*Caliris* Giglio-Tos
- First discoidal spine of forefemur placed inner to the second; foretibia with seven
 external spines *Leptomantis* Giglio-Tos

Genus *Leptomantis* Giglio-Tos

Leptomantis Giglio-Tos 1915. *Bull Soc. Entamol. Itali.* 46 87 Type species.

Leptomantis albella (Burmeister)

Diagnostic characters:

Body slender, pale green; antenna slender and backwardly directed; frontal sclerite transverse, superior edge arched; forecoxa with divergent internal apical lobes; femur simple, outer surface straight, with 4 external and 4 discoidal spines; foretibia with 7 external spines. Mesosoma long, slender, supra coxal dialation not well pronounced; metazona as long as forecoxa; wings semi hyaline; forewings costal area with transverse parallel veinlets; middle and hind legs long and slender; hind metatarsus longer than other all tarsal segments together.

Distribution: Asia, Tropical Oriental Region.

Five species are known from India.

Key to species Indian species of *Leptomantis* Giglio-Tos

1. Frontal sclerite wider.....2
 - Frontal sclerite narrow.....4

- 2 Prozona with black patch.....3
 - Prozona without black patch.....*L. parva* Werner

- 3 Forecoxa with 2 black spots; trochanter without black spots
 -*L. montana* Beier
 - Fore coxa without black spots; trochanter with black spot
 -*L. indica* Giglio-Tos

- 4 Trochanter with black spot.....*L. lactea* (Saussure)
 - Trochanter without black spot.....*L. nigrocoxata* Mukherjee

***Leptomantis parva* Werner**

(Figs.97-102) (Plate VII Fig.1)

Leptomantis parva Werner 1933, *Proc.Zool.Soci.London*, 1933: 890**Plesiotype:** Male: Body length 21 mm.

Colour: Delicate light green with yellowish tinge. Vertex dirty yellowish green with testaceous minute dots ; eyes black with dirty yellow tinge ; ocelli dirty greenish yellow on sides, centrally bright reddish pink between lateral ocelli, lateral ocelli pink; frontal sclerite dirty yellowish green with faint black tinge; antennal scape and pedicel concolorous with frontal sclerite, flagella wood brown becoming darker towards distally; mesosoma, legs and metasoma concolorous with frontal sclerite; spines of forefemur and foretibia black at tips only; tibial claw proximally green, distally rusty brown; wings light green, transparent, iridescent.

Head: 1.5x wider than high; vertex not smooth or flat, thrown into lobes; eyes globular; ocelli large; POL:OD:OOL = 3:3:7; frontal sclerite transverse, angular superiorly, 3 x wider than high; antenna filiform, thick, without setae.

Mesosoma: elongated , longer than forecoxa ; 4 x longer than wide at supra coxal dialation; prozona spatulate; metazona 4x longer than prozona; mesosoma not flat, slanting, slightly denticulated laterally, middorsally with weak longitudinal carina;

posteriorly arched. Forecoxal dorsal disc not flat, with midlongitudinal ridge, internal apical lobes slightly converging; femur not foliaceous, slender; with 4 external, 4 discoidal, internally 6 longer, 6 shorter spines; (the distal most two longer spines enclose two shorter spines); femur 1.2x longer than coxa and 1.8x longer than tibia; tibia 2 x longer than metatarsus. Middle and hind legs: coxa stouter; femur slender, 4 x longer than coxa, 1.6 x longer than tibia; tibia with pubescence; metatarsus longer than other two tarsal segments together. Wings: both wings hyaline, round at tip, much longer than metasoma, costal margin of forewing with minute setae, veinlets of costal area transverse, anterior and posterior radial veins branched, cross veins form wider cellular meshes.

Metasoma: fusiform; highly pubescent; cerci thicker and with pubescence.

Biology: Unknown, attracted to light.

Habitat: Usually seen at human inhabitations.

Distribution: India, (Kerala, Uttar Pradesh).

Materials examined: Plesiotype: 1 male, INDIA, Kerala, Kannur, 11-iii-1999, Shonitha. J . K.(DZCU) Other materials Examined: 1 male INDIA, Kerala, Kovoov, 9-viii-2001, Vyjayandi (DZCU), 1 female, INDIA, Kerala, Kovoov, 20-viii-2001, Vyjayandi (DZCU), 1 female, INDIA, Kerala, Chemenchery, 9-ix-2001, Sudheer (DZCU), 1 male, INDIA, Kerala, Kannur, Jathin, 30-x-2001, (DZCU).

Discussion: This species *Leptomantis parva* Werner is closely related to *Leptomantis montana* Beier in the following characters : 1. Frontal sclerite widely

arched. 2 . Wings hyaline except costal area, which is semi hyaline. This species *Leptomantis parva* Werner differs from *Leptomantis montana* Beier in following aspects : 1. Metazona without black lateral lines in *L . parva* (with black lateral lines in *L. montana*). 2. No black spots on the outer side of forecoxa in *L . parva* Werner. (with two black spots on the outer side of forecoxa in *L. montana*)

Subfamily Iridopteryginae

Body small, slender. Head thick; eyes globular, prominent; frontal sclerite transverse; antenna long with sparse setae. Mesosoma short; forelegs with 4 external, 3 discoidal spines; claw groove proximally placed; wings iridescent, hyaline, as long as body; cerci short.

Two tribes are known from India.

Key to Tribes

- Metazona with indistinct carina.....Iridopterygini.
 -- Metazona with distinct carina.....Tropidomantini(extralimital).

Tribe Iridopterygini

Claw groove at the proximal side of the forefemur. Metazona with indistinct carina.

Key to genera

1. Mesosoma saddle shaped, short; foretibia with 8-9 external spines
 *Hapalopeza* Stal
- Mesosoma with parallel margin, long; foretibia with 6-7 spines.....2

2. Mesosoma as long as forecoxa *Paranomantis* Mukherjee
- Mesosoma longer than forecoxa *Nanomantis* Saussure

Genus *Hapalopeza* Stal

Diagnostic characters:

Head thick; eyes globular, prominent; frontal sclerite transverse, trapezoid, upper margin wavy. Mesosoma short, with metazonal constriction; forefemur with 4 external, 3 discoidal spines; foretibia with 8 short, well separated internal spines; wings slightly longer than metasoma, hyaline, iridescent. Metasoma fusiform; supra anal plate short, round; cerci short, conical.

Key to Indian species of *Hapalopeza* Stal

1. Frontal sclerite with black patch.....2.
- Frontal sclerite without black patch.....3.

2. Antenna black alternates with white in colour.....*H. nitens* (Saussure)
- Antenna completely black.....*H. periyara* Mukherjee & Hazra

3. Body green, prozona without Y shaped mark.....*H. trissurensis*.sp. nov
- Body testaceous, prozona with Y shaped marking.....*H. nilgirica* Wood - Mason

***Hapalopeza periyara* Mukherjee & Hazra**

(Figs.103-109)

Hapalopeza periyara Mukherjee & Hazra 1985 *Entomon.* 10(4) 257. Holotype
India, Kerala(ZSI)

Plesiotype: Female Body Length 17mm.

Colour: Testaceous. Vertex testaceous with black patches on the inferior side, occiput with a round black spot; eyes light brown; ocelli ferrugeneous with black border; frontal sclerite, clypeus, labrum, mesosoma, forelegs, mid and hindlegs, metasoma concolorous with vertex. Mesosomal lateral border with a jet black line; forefemur with a jet black patch internally from middle to distal end, foretibia with a black streak on the internal proximal side; all spines of forelegs black at tips only; external lower half of fore and mid metatarsus jet black; wings iridescent, testaceous with fuscous veins.

Head: thick, 1.5x wider than high, vertex faintly lobed; eyes slightly oblong, emarginate; ocelli small, POL:OD:OOL=6:2:5 ; antenna long, slender, filiform, ciliated; frontal sclerite transverse, disc depressed, 1.6x wider than high, with median carina, superiorly arched, inferiorly concave; clypeus and labrum broad, carinated medianly.

Mesosoma: short, as long as forecoxa, saddle shaped, disc smooth, nondenticulated laterally; prozona raised, supra coxal dialation pronounced, 2.4x longer than broad at supra coxal dialation, metazona twice longer than prozona, with posterior constriction, inferiorly semicircular. Forelegs: coxa simple, without marginal spines, internal apical lobes divergent ; femur slightly dialated proximally, 1.2x longer than coxa, 2x longer than tibia, with wide ventral gap, with 5 external, 3 discoidal (third longest), internally with 6 longer and 7 shorter spines; claw groove proximally placed; tibia with 7 external and 12 internal spines; metatarsus slightly longer than tibia, 2x

longer than all the other tarsal segments together; middle and hindlegs : coxa, short, femur slightly longer than tibia in middlelegs, as long as tibia in hindlegs; metatarsus 2x longer than all other tarsal segments together. Wings: iridescent, longer than metasoma, ends round; forewing with minute bristles on the surface and along costal area, costal area opaque, rest subhyaline, enfumated, anterior radial vein bifurcates, veinlets broad celled .

Metasoma: fusiform, supra anal plate short, posterior tip triangular; cerci long, with pubescence.

Biology: Unknown.

Distribution: India: Kerala

Materials examined: Plesiotype: Female, INDIA, Kerala, Parambikulam W.L.S., 24-iii-1997, K.C.Gopi, (ZSI Calicut), Reg.No. 10146. Other materials examined: 1Female, INDIA, Kerala, Schendurini W.L.S., Rajacoop (Quilon), 14-viii-97, P.M. Surehsan, (ZSI Calicut), Reg.No. 10588,). 1Female, Perumthody(Quilon), 13 xi-97, P.M. Sureshan, (ZSI Calicut) Reg.No. 10588. 1Female, Amakulam, Kulathupuzha (Quilon), 16-viii-97, P.M.Sureshan(ZSI Calicut), Reg.No.10126. 1Male, Parambikulam W.L.S. , 25-iii-97, K.C.Gopi, (ZSI Calicut). 1Male, Agnamuzhi Pathanamthitta), 24-ii-97, P.M.Sureshan,(ZSI Calicut), Reg.No.10048.

Discussion: This species *Hapalopeza periyara* Mukherjee & Hazra comes nearer to *Hapalopeza niligirica* Wood-Mason in the following characters : 1. Vertex with straight superior margin. 2. Frontal sclerite hardly arched at middle 3. External

spines of forefemur gradually shorter towards apex. This species *Hapalopeza periyara* Mukherjee & Hazra differs from *Hapalopeza nilgirica* Wood-Mason in following characters :1. Presence of black rounded patches at occiput in *H. periyara*, (such a patch absent in *H. nilgirica*.) 2. Supra anal plate triangular in *H. periyara* (supra anal plate broadly triangular, round at tip in *H. nilgirica*.) 3. External spines of forefemur larger in *H. periyara* (external spines of forefemur comparatively shorter in *H. nilgirica*).

***Hapalopeza trissurensis* sp. nov**

(Figs.110-115)

Holotype: Male Body Length 16mm.

Colour: Green with wood brown and black tinge. Vertex wood brown at center, lateral lobes green, occiput with black spot; eyes, ocelli jet black; antenna : scape, pedicel green with brown tinge, flagellum fuscous; frontal sclerite, clypeus, labrum, gena green. Mesosoma, forelegs, mid and hindlegs green with brown tinge; forefemur from middle to distal end with a jet black patch, all spines green with black tips; foretibia internally with long black patch, all internal spines, claw, metatarsus jet black; wings enfumate, iridescent, costal vein green, all other veins fuscous. Metasoma light brown.

Head: thick, 1.9x wider than high; vertex centrally squarish with lateral triangular lobes, extending upto base of antenna; eyes globular, emarginate; ocelli large, all three of same size. POL:OD:OOL=6:2:5; antenna elongated, slender, filiform, with sparse, weak setae; frontal sclerite transverse, 1.9x wider than high, superior end almost straight; clypeus projecting.

Mesosoma: short, saddle shaped, 2.5x longer than wide, prozona oblong, metazona with posterior constriction, inferiorly semicircular, lateral margin non denticulated, non ciliated; forelegs simple, coxa with middorsal longitudinal ridge, superior border with sparsely distributed hairs, inferior apical lobes truncate ; trochanter well pronounced, with a few hairs; femur simple, superior border sinuate, 1.2x longer than coxa, 2.2x longer than tibia with 4 external, 3 discoidal (second one longest) internally with 6 longer and 5 shorter spines, between two distal longer spines without shorter spines; tibia with 8 external, 11 internal spines, arranged with wide gap; metatarsus as long as all other tarsal segments together; middle and hindlegs: simple, coxa short; midleg slightly shorter than hindlegs, midfemur slightly shorter than midtibia , hindfemur as long as hindtibia, wings: longer than metasoma, iridescent, in forewing anterior radial vein bifurcates distally, in hindwing anterior radial vein bifurcates and posterior radial vein trifurcates distally.

Metasoma: fusiform, supra anal plate short ,triangular; cerci short, with pubescence.

Material examined: Holotype : Male, India, Kerala, Trissur, 16-xi-2000, K. Usha (DZCU).

Discussion: This species *Hapalopeza trissurensis* sp.nov is closely related to *Haplopeza periyara* Mukherjee & Hazra in the following characters : 1. Head thick, eyes globular. 2. Mesosoma saddle shaped. 3. black round patch at occiput. 4. gap between two distal most longer spines. This species *Hapalopeza trissurensis* sp.nov. differs from *Hapalopeza periyara* Mukherjee & Hazra in following characters : 1. Body green with slight black tinge in *H. trissurensis* sp.nov (body brown in *H. periyara*. 2. Ocelli large, conspicuous, surrounded by black in *H.trissurensis* sp.nov (ocelli small, less conspicuous, without black border in *H. periyara*. 3. frontal sclerite 1.9 x longer than wide in *H.trissurensis* sp.nov (frontal sclerite 1.6x longer than wide in *H. periyara*.) 4. Lateral black border of mesosoma not well pronounced in *H.trissurensis* sp.nov (lateral black border of mesosoma distinct in *H. periyara*.). 5. foremetatarsus as long as all other tarsal segments in *H. trissurensis* sp.nov (fore metatarsus twice longer than all other tarsal segments in *H. periyara*).

Subfamily Liturgusinae

Diagnostic characters:

Body medium sized; bark coloured; vertex straight; eyes prominent, bulging round. Mesosoma short, flat, rhomboidal, margin angular, disc with bosses; forefemur short, stout, with 4 external, 4 discoidal spine, with wide ventral space. Metasoma fusiform.

Key to genera

- Costal area of forewing much narrower than discoidal area... *Humbertiella* Saussure
- Costal area of forewing almost as wide as discoidal area, gradually narrowed towards apex..... *Theopompa* Stal

Genus *Humbertiella* Saussure

Humbertiella Saussure 1869 *Mitt. Schweiz. Entomol. Ges.* 3 55 .Type

species *Humbertiella ceylonica* Saussure.

Diagnostic characters:

Vertex lobed; antenna slender; eyes conspicuous, round. Mesosoma short, trapezoid; forefemur stout, ventral gap wide, denticulated; foretibia well developed, with regularly spaced 9 spines.

Key to Indian species of *Humbertiella* Saussure

- | | | |
|---|--|---------------------------------|
| 1 | Longer internal spines of forefemur completely black..... | .2 |
| | - Longer internal spines of forefemur black at apex only..... | 3 |
| 2 | Frontal sclerite completely black..... | <i>H. ceylonica</i> saussure |
| | - Frontal sclerite with a whitish patch at the median curvature..... | |
| | | <i>H. nigrospinosa</i> Sjostedt |
| 3 | Costal area of forewing with parallel veinules..... | <i>H. Indica</i> Saussure |
| | - Costal area of forewing with reticulated venation | .4 |

4. Frontal sclerite with arched superior edge *H. affinis* Giglio-Tos
 - Frontal sclerite with superior edge almost straight.....*H. similis* Giglio-Tos

***Humbertiella affinis* Giglio-Tos**

(Figs 117-121) (Plate VI Fig.2)

Humbertiella affinis Giglio-Tos 1917 *Bull. Soc. Entomol. Ital.* 48 83.

Plesiotype: Female Body Length 35mm.

Colour: dark bark brown. Vertex wood brown, with fuscous patches ; eyes, clypeus, gena, frontal sclerite, mesosoma, forelegs, mid and hindlegs and metasoma concolorous with vertex; ocelli ferrugineous ; antennal scape, pedicel clay brown, flagellum darker towards apex; forefemur internally with two black patches one at claw groove, other distal to it ; all external, internal shorter spines of forefemur black at tips only, internal longer spines entirely black; mid and hindlegs: femur, tibia, metatarsus with fuscous annulations; forewings opaque, wood brown with fuscous patches, hindwings black with cream veins.

Head: triangular, 1.8 x wider than high, vertex with lobes; eyes globular, emarginate; ocelli small, POL:OD:OOL=10:3:10; antenna slender,(more slender than

H.similis), filiform; frontal sclerite transverse, 3.1x wider than high, superior border sinuate, four corners angular.

Mesosoma: rhomboidal, 1.4x longer than wide, disc with 4 pairs of bosses, anterior lateral corner angular. Forelegs: coxa short with dorsal longitudinal carina, internal apical lobes divergent; trochanter well pronounced ; femur stout, ventrally with wide, denticulated gap, distally with two genicular spines, 1.5x longer than coxa and tibia, with 4 external, 4 discoidal, internally with 6 longer and 7 shorter spines; tibia as equal as coxa, with 9 external, 10 internal spines; metatarsus as equal as all other tarsal segments together. Middle and hind legs: coxa, short, stout; femur stouter than and as long as tibia; tibia with two apical spine; metatarsus as long as all other tarsal segments together; Wings: shorter than metasoma; forewings leathery, opaque, posterior radial vein bifurcates twice proximally, anal segment opaque; hindwings costal area opaque, rest semi opaque, post radial vein branched.

Metasoma: longer than wings, broad, supra anal segment short, cerci thick, long.

Materials examined: Plesiotype: Female, INDIA, Kerala, Malaparamba, 11-vi-1998, Vyjayandi (DZCU). Other materials examined: 1Female, INDIA, Kerala, Malaparamba, 11-iii-98, Vyjayandi (DZCU). 1Female, INDIA, Kerala, Malaparamba, 15-vii-2001, Grace (DZCU). 1Female, INDIA, Kerala, Kottakkal, 17-iv-2001, Vyjayandi. 1Female, INDIA, Kerala, Trissur, 21-v-2000, Usha K. (DZCU).

Biology: Unknown.

Habitat: This is a bark dwelling species, fast runners, sometimes found among litter.

Distribution: India: Karnataka, Kerala, Orissa, Sri Lanka

Discussion: This species *Humbertiella affinis* Giglio-Tos is closely related to *Humbertiella similis* Giglio-Tos in the following characters: 1. Vertex lobbed. 2. Eyes globular. 3. Mesosoma rhomboidal, with bosses. 4. forefemur stout, with two black patches internally. This species *Humbertiella affinis* Giglio-Tos is different from *Humbertiella similis* Giglio-Tos in following characters : 1. Frontal sclerite 3.1 x wider than high, superior border more arched in *H. affinis* (frontal sclerite 4 x wider than high, superior border less arched in *H. similis*). 2. Forewing opaque, dark bark brown in *H. affinis* (forewing sub opaque, light greyish brown in *H. similis*). 3. All the internal long spines of forefemur entirely black in *H. affinis* (all the internal spines of forefemur black at tips only in *H. similis*). 4. Ocelli less conspicuous, POL:OD:OOL=10:3:10 in *H. affinis* (ocelli more conspicuous , POL:OD:OOL= 7:5:10 in *H. similis*).

***Humbertiella ceylonica* Saussure**

(Figs122-126)

Humbertiella ceylonica Saussure 1869 *Mitt. Schweiz. Entomol. Ges.* 3 62

Holotype Srilanka .

Theopompa sepentrionum Wood-Mason 1891 *A Catalogue of Mantodea* 2 61**Plesiotype:** Female body Length 33 mm.

Colour: Wood brown with black tinge. Head: dark wood brown with fuscous patches; eyes, clypeus, labrum, gena, mesosoma, fore,middle and hindlegs, metasoma concolorous with vertex; antenna light brown; frontal sclerite disc, black; forecoxa with longitudinal black streaks; forefemur , foretibia with 3 well pronounced black transverse bands; metatarsus ventrally black, forefemoral and foretibial external spines black at apex only, internal spines jet black forewing costal area black, rest wood brown with fuscous transverse patches, veins black alternates with light brown; hind wings distal superior corner black.

Head: triangular, 1.3 x wider than high; vertex with 5 lobes, lateral lobes well pronounced; eyes globular dorsally, ventrally oblong, emarginate; ocelli small, inconspicuous. POL :OD :OOL = 7: 2: 10; frontal sclerite 2.5 x wider than high, disc

flat non carinated, superior border arched, inferiorly truncate; clypeus elevated, shelf like; labrum rhomboidal.

Mesosoma: short, rhomboidal; supra coxal dialation well pronounced, 2x longer than wide at supra coxal dialation, prozona spatulate, metazona 1.8 x longer than prozona, with well pronounced posterior constriction, carinated middorsally. Forelegs: coxa dorsally with longitudinal ridge, ventrally smooth, superior and inferior borders slightly serrated internal apical lobes divergent; trochanter slightly swollen; femur bulged, outer border wavy, ventrally grooved, with sub marginal rows of denticles, with 4 external, 4 discoidal, internally 5 longer and 5 shorter spines, 1.7x longer than coxa and tibia, 2 x longer than wide; tibia with 9 external shorter, 10 internal longer spines, 2x longer than metatarsus; metatarsus a little longer than all other tarsal segments together. Middle and hindlegs: coxa short, middle leg shorter than hindleg, midfemur 1.3 x longer than mid tibia; hindfemur stouter, 2x longer than hind tibia, metatarsus slightly longer than all other tarsal segments together. Forewings opaque, costal area reticulately veinated, posterior radial vein bifurcates twice proximally; hindwings sub hyaline.

Metasoma: shorter than wings, broader, cerci many segmented.

Material examined: Plesiotype: INDIA, Kerala, Kotavasal (Aryankavu range), Quilon, 15-viii-1997, P.M.Sureshan, (ZSI Calicut) Reg.No. 10585. Other materials examined: 1 Male, INDIA, Kerala, Kuttalum Fifth falls, 1991-1993, Edwin (DZCU).

Biology: Unknown.

Distribution: India, Kerala, Karnataka, Tamil Nadu , Assam, Uttar Pradesh, West Bengal, SriLanka.

Discussion: This species *Humbertiella ceylonica* Saussure is closely related to *Humbertiella similis* Giglio-Tos in following the characters: 1. Vertex 5 lobbed. 2 Mesosoma rhomboidal. 3. slightly bulky forefemur, with grooved ventral side, dentaculated submargins. This species *Humbertiella ceylonica* Saussure differs from *Humbertiella similis* Giglio-Tos in following characters: 1. Forefemur with 3 internal black transverse bands in *H. ceylonica*. (forefemur internally with two black patches , one at claw groove, the other distal to it, in *H. similis*.) 2. All the internal spines of forefemur ,foretibia jet black in *H. ceylonica* .(all the internal spines of forefemur, foretibia black at tips only in *H. similis*).3. Forewings leathery reddish brown with black , opaque, costal area in *H. ceylonica*. (forewings bark brown with semi opaque costal area , less leathery in *H. similis*). 4.Hindwings semi opaque, reddish brown in *H. ceylonica*. (hindwings transparent, smokey in *H. similis*).

Humbertiella similis Giglio-Tos

(Figs 116,127-131) (Plate VI Fig.3)

Humbertiella indica Bolivar 1897 *Ann. Soc. Entomol. France* 66 303.*Humbertiella similis* Giglio-tos 1917 *Bull. Soc. Entomol. Ital.* 48 83 .**Plesiotype:** Male body Length 35mm .

Colour: Bark brown. Head: vertex clay brown with fuscous patches; eyes, antenna, frontal sclerite, clypeus, mesosoma, forelegs, middle and hindlegs and metasoma concolorous with vertex; ocelli lemon yellow, mesosternum black at coxal origin; forefemur with two black patches internally one at claw groove other distal to it , all spines black at tips only. Forewings greyish brown, with dark brown blotches, veins clay brown alternates with dark brown; hindwings hyaline, smokey.

Head: triangular, 1.5 x wider than high; vertex 5 lobbed; eyes globular, well projecting; ocelli prominent, closely placed; POL :OD :OOL =7:5:10 antenna filiform, scape placed closer to frontal sclerite, slender, non ciliated; frontal sclerite 4 x wider than high, transverse superior end sinuate, inferior end slightly arched.

Mesosoma: rhomboidal, anterior lateral corner angular, supra coxal dialation not much pronounced, 1.6 x longer than wide, disc not smooth, with 5 pairs of bosses,

prozona elevated. Forelegs: coxa with middorsal ridge, ventrally smooth, internal apical lobes divergent; trochanter bulky; femur 1.8 x longer than coxa and tibia, ventral proximal aspect bulged, 4 x longer than broad, superior border sinuate, with 4 external, 4 discoidal and internally with 6 longer, 8 shorter spines, proximally spines closely placed, distally distributed with wide gap, ventrally femur with wide groove, submarginally denticulated, claw groove proximally placed; tibia with 9 external, 10 internal spines, nearly 2 x longer than metatarsus; metatarsus a little shorter than all other tarsal segments together. Middle and hindlegs: coxa stout, femur stouter than tibia; tibia slender, shorter than femur in midlegs; a little longer than femur in hindlegs, with two apical spines; metatarsus shorter than all other tarsal segments together.

Metasoma fusiform, as equal as wings, supra anal plate short, cerci long, hairy.

Material examined: Plesiotype: Male, INDIA , Kerala, Thottilppalam, 5-v-2000, Vyjayandi (DZCU). Other materials examined: 1 Female, INDIA, Kerala ,Nanminda, 15-x-2000, Sreekala (DZCU). 1Male, INDIA , Kerala, Kovoov, 11-iii-1998, Vyjayandi, (DZCU). 1Male, INDIA , Kerala, Pulppally, 8-ix-1999, Vyjayandi (DZCU). 1Male, INDIA, Kerala, Thaliparamba, 16-i-1999, Vyjayandi, (DZCU). 1Female,INDIA, Kerala, Malaparamba, 17-ix-2001, Vyjayandi,(DZCU). 1Female, INDIA, Kerala, Trissur,8-v-2000, Usha.K. (DZCU).

Biology: Unknown

Habitat: This species is usually seen at human inhabitations.

Distribution: India: Himachal Pradesh, Kerala, Jammu, Madhya Pradesh, Orissa, Uttar Pradesh, Nepal, Sri Lanka.

Discussion: This species *Humbertiella similis* Giglio-Tos comes nearer to *Humbertiella affinis* Giglio-Tos in the following characters: 1. Eyes globular, 2. Mesosoma rhomboidal 3. Forefemur bulged proximally, with 4 external and 4 discoidal spines. 4. Metatarsus as long as all the other tarsal segments together. This species *Humbertiella similis* Giglio-Tos differs from *Humbertiella affinis* Giglio-Tos in the following characters: 1. Frontal sclerite 4 x wider than high, superior border less arched in *H. similis* (frontal sclerite 3.1x wider than high, superior border more arched in *H. affinis*). 2. Forewing semi opaque transparent, smoky, with blotches in *H. similis* (forewing opaque in *H. affinis*). 3. Hindwing hyaline, smoky in *H. similis* (hindwing sub opaque, black in *H. affinis*). 4. Ocelli large, conspicuous, POL:OD:OOL=7:5:10 in *H. similis* (ocelli small, POL:OD:OOL=10:3:10 in *H. affinis*). 5. All the internal spines of forefemur black at tips only in *H. similis*. (all the spines of forefemur entirely black in *H. affinis*).

Subfamily Mantinae

Diagnostic characters:

Body medium to somewhat large in size; brown or green insects. Head small, eyes globular, antenna slender; fore femur with 4-5 external spines and 3-4 discoidal spines; fore tibia with normal spines. Mesosoma longer than forecoxa. Wings well developed in both sexes, occasionally reduced in females. Supra anal segment short.

Two tribes are known in India

Key to tribes

- Forefemur with 4 discoidal and 4 external spine; wings usually longer than metasoma..... Mantini
- Fore femur with 3 discoidal and 4-5 external spines; wings usually shorter than metasoma.....Miomantini

Tribe Mantini

Mesosoma as long as or longer than fore coxa; forefemur with 4 external and 4 discoidal spines, second discoidal spine much longer than the first. Both wings well developed, usually longer than metasoma in both sexes.

Eight genera are present in India.

Key to genera

1. Frontal sclerite almost as wide as high.....2
 - Frontal sclerite 2-3 times wider than high.....4

2. Hind femur with apical spine; fore and hind wings without transverse brown patches.....3
 - Hind femur without apical spines; fore and hind wings with transverse brown patches.....*Plistospilota* Giglio-Tos

3. Fore wing border crenulated.....*Parahierodula* Giglio-Tos
 - Fore wing border not crenulated.....*Hierodula* Burmeister

4. Frontal sclerite upper margin spiniform.....*Oxymantis* Werner
 - Frontal sclerite upper margin arched or angular5

5. Eyes globular.....6
 - Eyes oblong or conical.....*Mesopteryx* Saussure

6. Body somewhat robust, antenna not much elongated, hind femora without apical spine.....7
- Body slender, much elongated; antenna very much elongated, hind femora with apical spine.....*Tenodera* Burmeister
7. Claw groove placed at distal part of fore femur.....*Statilia* Stal
- Claw groove placed at middle of fore femur.....*Mantis* Linnaeus

Genus *Hierodula* Burmeister

Hierodula Burmeister 1838. *Hand b. Entomol.* 2: 536. Type species *Hierodula membranacea* (Burmeister).

Diagnostic characters:

Body large; eyes globular laterally; conical in front view; frontal sclerite usually higher than wide bicarinate; mesosoma elongated, robust, carinated; supracoxal dialation oval. Forecoxa with marginal spines, internal apical lobes contiguous; forefemur with 4 external, 4 discoidal (3rd longest) spines; distal internal two long spines enclose two smaller spines. Mid and hindfemur with apical spines; forewing border not crenulated, with broad, opaque, costal area; rest semi hyaline, hind wings hyaline. Metasoma broad, supra and plate transverse and short.

Distribution: India, Java, Indonesia, China, Taiwan, New Guinea, Australia.

The Genus *Hierodula* Burmeister is divided into 2 subgenus.

Key to Subgenera

- Dialation of the mesosoma not extending upto the base..... *Hierodula*
(*Hierodula*) Giglio-Tos
- Dialation of the mesosoma extending upto the base.....*Hierodula*
(*Rhombodera*)Giglio-Tos

Subgenus *Hierodula (Hierodula)* Giglio-Tos

There are 12 species reported from India.

Key to Indian species of *Hierodula(Hierodula)* Giglio-Tos

1. Forecoxa with sharp saw-like marginal spines2
 - Forecoxa with obtuse, stout marginal spines6
2. Forecoxal spines 15-20 in number (Fig.149)3
 - Forecoxal spines less than 10 (Fig.166)4

3. Clypeus broader than high; metatarsus 1.4x longer than all other tarsal segments together (Figs. 140, 142) *H. (H.) keralensis* sp. nov.
- Clypeus higher than broad, metatarsus as long as all other tarsal segments together (Figs. 147-149) *(H.) membranacea* (Burmeister)
4. Fore coxa with 7-9 marginal spines without any spinules among them 5
- Fore coxa with 5-6 marginal spines with a few spinules among them
..... *H. (H.) unimaculata* (Olivier)
5. All internal spines of fore femora black at apex only
..... *H. (H.) nicobarica* Mukherjee
- First and third discoidal, first, fifth and last internal spines of fore femora entirely black *H. (H.) beieri* Mukherjee
6. Metazona shorter than forecoxa (Fig. 159) 7
- Metazona much longer than forecoxa (Fig. 165) 8
7. Prosternum with 2 black bands *H. (H.) assamensis* Mukherjee
- Prosternum without such bands *H. (H.) tenuidentata* Saussure
8. Forecoxa with 8-10 marginal spines trochanter black at apex
..... *H. (H.) grandis* Saussure

- Forecoxa with less than 8 marginal spines trochanter not black at apex
.....9
- 9. Forecoxa with 2-3 marginal spines (Fig.136)... ..*bipapilla* (Audinet-Serville)
- Forecoxa with 4-7 marginal spines (Fig.166)..... 10
- 10. Pro and mesosternum with black markings 11
- Pro and mesosternum without black markings with two white spots
.....*H. (H.) saussurei* Kirby
- 11. Pro and mesosternum with oblique stripes*H. (H.) ventralis* Giglio-Tos
- Pro and mesosternum with a median stripe and 4 round spots
.....*H. (H.) doveri* Chopard

***Hierodula (Hierodula) bipapilla* (Audinet-Serville)**

(Fig.133-138)

Mantis bipapilla Audinet-Serville 1839 *Hist. Nat. Ins. Orth.* p.188.

Hierodula patellifera Westwood 1889 *Revis. Mantid.* p.35.

Hierodula bipapilla Kirby 1904. *Cat. Orth. Brit. Mus.* 1. 245.

Hierodula (Hierodula) bipapilla Giglio-Tos. 1927. *Das Tierreich* 50: 448.

Plesiotype: Female length 74 mm.

Colour: Green. Vertex dirty greenish brown; eyes concolorous with vertex; ocelli light orange; antenna light brown, clypeus, gena and labrum greenish brown. Mesosoma concolorous with vertex, more greenish dorsally; sternum with two white spots; forelegs concolorous with vertex, with marble spines; forecoxa testaceous apically; femur with purplish patch at distal end, all spines black at tips only, internal proximal four spines and longer distal spines brown; second to last tarsal segments with black spots; middle and hind legs dirty green, metatarsus with a black spot inside; forewings costal area opaque moss green; stigma yellow with a pink tinge distally; anal membrane transparent; discoidal area subhyaline; hindwings transparent; all veins transparent, colourless. Metasoma testaceous to green.

Head: triangular, 1.5x wider than high, vertex smooth, lateral lobes slightly prominent; eyes globular, emarginate, conical in front view; ocelli closely placed, lateral ones slanting; POL: OD: OOL = 6 : 4 : 9 ; antenna slender, non setaceous; frontal sclerite rhomboidal, 1.2 x wider than high, bicarinate, superiorly angular, inferiorly slightly sinuate, disc flat, labrum trapezoid, carinate.

Mesosoma: elongated, longitudinally carinated; supra coxal dialation oval; prozonal denticles well pronounced than metazonal ones; metazona immediately narrows posterior to supra coxal dialation; laterally denticulated; 3.6x longer than wide at supra coxal dialation; metazona 2.6x longer than prozona ; forelegs: coxa simple,

internal apical lobes contiguous, with 2-3 obtuse marginal spines, outside with longitudinal ridge, innerside disc flat; femur 1.3x longer than coxa, 2.2x longer than tibia, with 4 external, 4 discoidal (3rd one longest), 7 internal longer, 8 internal shorter spines; tibia with 9-10 external and 14-15 internal spines; metatarsus 1.2x longer than all other tarsal segments together ; middle and hind legs: simple, middle leg slightly shorter than hind leg, hind femur more than 3x longer than hind coxa, a little longer than hind tibia, metatarsus as equal in length as all other tarsal segments together. Wings: both wings longer than metasoma forewings with opaque costal and semihyaline discoidal areas; costal vein bifurcates distally, anterior radial vein bifurcates at middle, posterior radial vein bifurcates proximally and rebranches twice; hindwings hyaline, posterior radial vein bifurcates thrice, distal portion with reticulate venation.

Metasoma: flat, becoming broader towards posteriorly; supra anal plate short and transverse; posterior tip and cerci with pubescence cerci long, conical.

Materials examined: Plesiotype: Female, INDIA, Kerala, Manjeri, 2-ii-99 Fousi K. (DZCU).

Biology: Unknown.

Habitat: Among bushes at less disturbed area.

Distribution: India: Kerala, Bihar, Himachal Pradesh, Uttar Pradesh, West Bengal, Java, Formosa, Japan, China, Taiwan.

Discussion: This species *Hierodula (Hierodula) bipapilla* (Audinet-Serville) is closely related to *Hierodula (Hierodula) ventralis* Giglio-Tos in following characters:

1. The general appearance and colour of the body.
2. Structure of the frontal sclerite.
3. Number of spines on the femur.
4. Size and shape of foretibia and foremetatarsus.

But this species *Hierodula (Hierodula) bipapilla* differs from *Hierodula (Hierodula) ventralis* Giglio-Tos in the following characters:

1. In *Hierodula (H.) bipapilla* only 2-3 blunt spines on the forecoxal margin (whereas in *Hierodula (H.) ventralis* there are 5-6 obtuse spines on margin of the coxa).
2. A brownish green patch on the distal end of forecoxa present in *H. (H.) bipapilla* (such a patch absent in *H. (H.) ventralis*).
3. Brownish markings of lower part prosternum are less distinct in *H. (H.) bipapilla* (distinct blackish brown markings on the prosternum in *H. (H.) ventralis*).
4. Proximal forefemoral denticles are less in number and less distinct in *H. (H.) papilla* (proximal forefemoral denticles are more in number and more pronounced in *H. (H.) ventralis*).

***Hierodula (Hierodula) keralensis* sp. nov.**

(Figs. 139-145) (Plate VIII Fig. 3)

Holotype: Male Body length 83 mm.

Colour: Light green with slight ferrugeneous prozonal border. Vertex moss green with faint black tinge; ocelli yellowish orange with black border; frontal sclerite moss green with brown tinge, clypeus and labrum bright moss green without any black tinge; antennal scape and pedicel concolorous with frontal sclerite; flagella fuscous. Mesosoma: dirty greenish testaceous at middle, metazonal border ferrugeneous; posterior lateral sides testaceous; sternum yellowish green with brown streak; post mesosternum with two black dots; forelegs concolorous with mesosoma, coxal spines yellowish green; trochanter moss green, all spines of forefemur and foretibia black at tips only, internal longer spines with a black dot at the middle other than at tips; tibial claw green, tip testaceous to black; metatarsus and other tarsal segments green with black tips; middle and hind legs: coxa green to testaceous, femur completely testaceous, tibia greenish with yellow tinge, metatarsus and other tarsal segments dirty green; forewing with costal area moss green and opaque discoidal area light green, semihyaline; stigma yellow; veins light green. Metasoma testaceous with green tinge.

Head: triangular, 1.2x wider than high; vertex smooth, lateral lobes more prominent; eyes globular laterally, oval ventrally; emarginate; ocelli larger, prominent, placed slightly elevated, POL: OD: OOL = 1: 1: 2; antenna filiform, slender, non ciliated; frontal sclerite pentagonal, almost as wide as high, superior margin slightly angular, disc not much depressed, bicarinate, inferiorly weakly arched and lateral corners bluntly conical; clypeus transverse nearly 2x wider than high, with 2 bosses; labrum transverse.

Mesosoma: elongated, longer than forecoxa, robust; supra coxal dialation oval, 3.6x longer than wide at supra coxal dialation prozona bluntly spatulate with denticulated margin; disc with carina; metazona 2.5x longer than prozona. carina not well pronounced as in *H. (H.) membranacea*, inferiorly arched slightly Forelegs: stouter than *H. H. membranacea*; coxa with seventeen strong saw-like spines; internal apical lobes contiguous, inferior margin serrated; femur slightly longer than coxa and 3x longer than tibia, with 4 external, 4 discoidal, 8 internal longer, 7 internal shorter spines; tibia with 10 external and 11 internal spines; metatarsus slightly shorter than tibia and 1.4x longer than all other tarsal segments together. Middle and hind legs: slender, coxa shorter, femur and tibia almost equal in length; tibia more slender than femur, metatarsus 1.3x longer than other tarsal segments together. Wings: both wings longer than metasoma; forewing with costal area broader, opaque, discoidal area semihyaline; anterior radial vein bifurcates at middle and branches; discoidal vein bifurcates twice; hind wing hyaline; posterior radial vein bifurcates thrice.

Metasoma: a little flat posteriorly; supra anal plate transverse; cerci short, slender.

Material examined: Holotype: INDIA, Kerala, Attappadi, 1-xii-2000; Vyjayandi, M.C (DZCU).

Biology: Unknown.

Habitat: Seen among leaves of undisturbed areas.

Discussion: This species *Hierodula (Hierodula) keralensis* sp. nov. is closely related to *Hierodula (Hierodula) membranacea* (Burmeister) in following characters: 1. colour, size and general appearance of the body .2. Presence of more than fifteen superior marginal spines on the forecoxa 3. Frontal sclerite almost as high as wide. This species *Hierodula (Hierodula) keralensis* sp. nov. differs from *Hierodula (Hierodula) membranacea*(Burmeister) in following characters: 1. Clypeus twice wider than high in *H. (H.) keralensis* sp. nov. (clypeus as wide as high in *H. (H.) membranacea*) 2. mesosoma, coxa and femur of forelegs robust and shorter; metazona 2.5x longer than prozona in *H. (H.) keralensis* sp. nov. (mesosoma, coxa and femur of forelegs slender; metazona 3x longer than prozona in the case of *H. (H.) membranacea*) 3. mesosomal carina not much pronounced in *H. (H.) keralensis* sp. nov.,(mesosomal carina well pronounced in *H (H) membranacea*) 4. Foretibia : foremetatarsus 4:3 in *H. (H.) keralensis* sp. nov. (5:3 in *H. (H.) membranacea*) 5. metatarsus: other tarsal segments 3:2 in *H. (H.) keralensis* sp. nov. (the ratio 1:1 in *H. (H.) membranacea*) 6. Prozonal outer margin denticulated in *H. (H.) keralensis* sp. nov.) (not denticulated in *H. (H.) membranacea*).

***Hierodula (Hierodula) membranacea* (Burmeister)**

(Figs. 132, 146-150) (Plate VIII Fig. 2)

Mantis (Hierodula) membranacea Burmeister 1838. *Handb. Ent.* V2, p. 536.

Stagmatoptera veneratoria Saussure 1870. *Mitt. Schweiz. Entomol. Ges.* 3: 232.

Hierodula birivia Wood-Mason 1878. *Ann. nat., Hist.* Vol. 1, p. 146.

Hierodula membranacea W.F. Kirby 1904. *Cat. Orth. Brit. Mus.* V. 1, p. 246.

Hierodula (Hierodula) membranacea Giglio-Tos. 1927. *Das Tierreich* 50: 440.

Plesiotype: Male length 90 mm.

Colour: Light green. Vertex dirty yellowish green with light testaceous tinge; eyes wood brown with black tinge ventrally, dorsally dirty yellowish green; ocelli yellowish orange; frontal sclerite and clypeus concolorous with vertex, carina slightly testaceous; labrum dark green; antennal scape and pedicel yellow, flagella yellow at base, gradually becoming fuscous towards tip; mesosoma and legs green to testaceous; forecoxal spines green; forefemoral spines green, black at apex only; metatarsus green, other tarsal segment with black tinge at apices; forewing with costal area green; stigma yellow; other parts of forewing and hind wings hyaline, light green. Metasoma green to fuscous.

Head: triangular, 1.4x wider than high; vertex not flat, mid vertex a little elevated; lateral lobes well pronounced; eyes globular, emarginate, in front view slightly conical; ocelli conspicuous closely placed on elevated platform; POL : OD : OOL = 5: 6: 10; antenna filiform, slender, with sparse delicate cilia; frontal sclerite 1.2x wider than high, superiorly semicircular, not angular, disc a bit depressed with three longitudinal carinae, one median, two lateral; clypeus elevated with transverse and longitudinal carinae.

Mesosoma: elongated, longer than forecoxa; supra coxal dialation not much pronounced, 4x longer than broad at supracoxal dialation; prozona spatulate with median longitudinal depression; 3x longer than metazona; metazona carinated middorsally towards posteriorly, arched inferiorly, laterally not denticulated; forecoxa ridged outwardly, outer superior margin with nineteen sharp spines, all not of equal size, inferior end serrated, internal apical lobes contiguous; forefemur not dialated, with 4 external, 4 discoidal (3rd spines twice longer than second), 7 longer internal, 8 shorter internal spines, distally internal spines spaced more than proximally, distal most two longer internal spines enclose two shorter spines; forefemur a little longer than forecoxa and 2x longer than tibia; tibia with 11 external and 12 internal spines; spines distally elongate; metatarsus as long as all other tarsal segments together; middle and hind legs slender; coxa short; hind femur 5x longer than coxa, slightly shorter than tibia; metatarsus as long as all other tarsal segments together. Wings: longer than metasoma, forewings costal area opaque, discoidal area subopaque;

stigma well pronounced; anterior radial vein bifurcates immediately distal to stigma, posterior radial vein bifurcates proximally; hind wing hyaline, radial veins bifurcate.

Metasoma: fusiform, with broad tip; supra anal plate transverse, cerci shorter, slender with pubescence.

Materials examined: Plesiotype: male. INDIA: Kerala, Pulpally (Wynad dist.) 18-ix-1999, Vyjayandi. M.C., (DZCU). Other materials examined: 1 Male, INDIA, Kerala, Sulthan Battery. 11-ix-99, Vyjayandi. M.C., 1 Male, Kerala, Trissur, 15-ix-99, Usha.K. 1 Male, Kerala, Wynad, 6-iii-97, Joshila, (DZCU). Kerala, Cali. Uni. Campus, 11-x-98, Lakshmy, (DZCU). 1 Female, Kerala, Cali. Uni. Campus, 11-ii-99, Priya Menon, (DZCU). 1 Female, Kerala, Cali. Uni. Campus, 11-iii-2000, Beena, (DZCU). 1 female, Kerala. Periyar Tiger Reserve Mullakudy (Idukki Dist.) 11-xi-96, P.M. Sureshan, (ZSI Calicut) Reg. No. 9552. 1 Male, Kerala, Parambikkulam; Aliyar Project, 23-iii-93, K.C.Gopi, (ZSI Calicut), Reg.No.10,23, 1 Male, Kerala, Parambikulam, Karappara, 26-iii-98, K.C.Gopi, (ZSI Calicut), Reg.No.10, 157.2 Males, Kerala, Quilon, Kotavasal, Aryankavu range, 5-viii-97, P.M. Sureshan, (ZSI Calicut), Reg. No. 10,585. Kerala, Pathanamthitta, Konni, 24-ii-97, P.M. Sureshan, (ZSI Calicut) Reg.No. 10,064.

Biology: Unknown.

Habitat: Green bushes, usually attracted to light.

Distribution: India (Kerala, Tamil Nadu, Orissa), Sri Lanka, Indonesia, China.

Discussion: This species *Hierodula (Hierodula) membranacea* (Burmeister) comes near to *Hierodula (H.) grandis* Saussure in the following characters: 1. General size of the body, robust, green. 2. Posterior side of metazona almost parallel and a little dilated at base. 3. Frontal sclerite almost as high as wide. But this species *Hierodula (Hierodula) membranacea* (Burmeister) differs from *Hierodula (Hierodula) grandis* in following characters. 1. Forecoxal marginal spines at 15-20 in *H. (H.) membranacea* (fore coxal margin with 8-10 spines in *H. (H.) grandis*). 2. Superior border of frontal sclerite semicircular, arched in *H. (H.) membranacea*, (superior border of frontal sclerite angular in *H. (H.) grandis*). 3. Fore trochanter not black in *H.(H.) membranacea* (fore trochanter black at apex in *H.(H.) grandis*).

***Hierodula (Hierodula) saussurei* Kirby**

(Figs. 151-156)

Hierodula (Hierodula) saussurei F. Kirby 1904. *Cat. Orth. Brit. Mus.* 1: 245. Syntype Nepal. (BMNH).

Plesiotype: Female Body length: 67 mm.

Colour: Green. Vertex dirty green, side lobes with testaceous tinge; eyes dull black; ocelli orange to ferrugeneous; frontal sclerite concolorous with vertex; labrum yellow; antennal scape and pedicel dirty green, distally brown; mesosoma: dirty green, lateral sides testaceous; mesosternum basally with brown tinge; forelegs concolorous with vertex; coxal marginal spines marble; femur with two faint black streaks; all external and smaller internal spines black at tips only; discoidal spines and longer internal spines (except distal longest) faint black; metatarsus dirty yellowish green externally, internally with black dots at tips; middle and hind legs: coxa, tibia and metatarsus greenish yellow, femur light green with testaceous tinge; forewings green with brown reticulated veins; stigma yellow with brown tinge at sides; hindwings light green, hyaline. Metasoma testaceous.

Head: triangular, 1.2x wider than high; vertex smooth, lateral lobes a little prominent; eyes globular dorsally, subconical ventrally; ocelli closely packed, POL:

OD: OOL = 7:5:10; antenna slender, without setae; frontal sclerite: disc rhomboidal, flat, bicarinate, superior border angular, as broad as high; labrum slightly elevated.

Mesosoma: longer than forecoxa; supra coxal dialation oval, immediately narrows posterior to it, laterally denticulated, 5.7x longer than broad at supra coxal dialation; metazona slender, 2.5x longer than prozona, inferiorly slightly arched. Forelegs: coxa ridged externally, internally flat, with 6-7 strong, stout marginal spines, with 4-5 submarginal verrucose patches, internal apical lobes contiguous; femur slightly longer than coxa, with 4 external, 4 discoidal (third longest and flat) internally 7 longer, 8 shorter spines, distally two longer spines enclose two smaller spines; 2.12x longer than tibia; tibia 1.3x longer than metatarsus; metatarsus 2x longer than all other tarsal segments together. Middle and hind legs: middle leg slightly shorter than hind legs, coxa short, femur 1.3x longer than fibia, metatarsus 2x longer than tibia and as equal as all other tarsal segments together. Forewing opaque except at apex, with dense reticulate veins; costal area broader, anterior radial vein bifurcates distal to stigma, posterior radial vein bifurcates proximally and then rebranches; ulnare vein bifurcates twice.

Metasoma: shorter than wings, slightly broad, supra anal plate short; cerci short with pubescence.

Materials examined: Plesiotype: female, INDIA, Kerala, Calicut University Campus, 31-iv-1999 , Lakshmi DZCU). Other materials examined: 1 female: INDIA, Kerala, Malaparamba (Calicut) 17-viii-2000, Shija (DZCU) 1Female, Kerala ,Kasargod, 14-ix-99 , Balamony (DZCU). 1 Female,Calicut University Campus, 15-vi-99 , Lakshmy (DZCU).

Biology: not known.

Habitat: undisturbed green bushes.

Distribution: India, Arunachal Pradesh, Bhutan, China, Indonesia, Java.

Discussion: This species *Hierodula (Hierodula) saussurei* Kirby closely resembles *Hierodula (Hierodula) doveri* Chopard in the following characters: 1. Size, shape, colour and general appearance of the body .2 .Supra coxal dialation oval .3. Forelegs coxa with 5-6 tubercular spines . 4 .External spines of forefemur black at apex only, internal spines faint black. This species *Hierodula (Hierodula) saussurei* Kirby differs from *Hierodula (Hierodula) doveri* Chopard in following respects: 1. In *H. (H.) saussurei* there are 4-6 verricose patches at the base of the coxal spine (in *H. (H.) doveri* these verricose patches are absent .2 In *H. (H.) saussurei* mesosternum without 4 round brownish spots (a median black stripe and 4 round brown spots at the base of mesosternum in *H. (H.) doveri*).

***Hierodula (Hierodula) tenuidentata* Saussure**

(Figs.157-162)

Hierodula tenuidentata Saussure. 1869. *Mit. Schweiz. Entomol. Ges.* 3: 68.*Hierodula simulacrum* Westwood. *eviv. Mantid.* p.34.*Sphodromantis tenuidentata* W.F. Kirby. *ibid.* V. 1. p.244.*Hierodula (Hierodula) tenuidentata* Giglio-Tos. 1927. *Das Tierreich.* 50: 444.**Plesiotype:** Female Body length 75 mm.

Colour: Green. Vertex dirty light green; eyes dull orange; ocelli light yellow; antenna, frontal sclerite, clypeus and labrum concolorous with vertex; gena yellow. Mesosoma middorsally yellow, laterally green; mesosternum straw yellow with brown tinge posteriorly; forelegs dirty yellow with testaceous streak mid longitudinally; all spines except longer internal spines yellowish green, black at tips only, longer internal spines dark brown externally; middle and hind legs: coxa and femur dirty yellow; tibia testaceous, metatarsus and other tarsal segments black at tips internally; wings light green, forewings with opaque costal area, stigma yellow, discoidal area hyaline, hind wings hyaline; Metasoma dirty yellow.

Head: triangular, 1.3x wider than high, vertex smooth, lateral lobes prominent; eyes globular laterally, subconical ventrally; ocelli large, closely placed; POL: OD: OOL = 4 : 2 : 5 ; antenna slender, non ciliated; frontal sclerite pentagonal, 1.2x wider

than high, disc depressed, bicarinate, angular superiorly, with a tubercle at center, inferiorly sinuate; labrum superior end carinated, disc depressed.

Mesosoma: oval shaped, slightly longer than forecoxa; supra coxal dialation oval, sides slightly laminated; border denticulated; 2.5x longer than wide at supra coxal dialation with mid dorsal depression; prozona oval, denticulated laterally, metazona 2x longer than prozona; ventrally mesosternum with 2 pairs of blunt large tubercles. Forelegs: coxa ridged dorsally; superior margin with five blunt spines, inferior margin serrated, internal apical lobes convergent; femur simple, 1.3x longer than coxa and 2.1x longer than tibia, with 4 external, 4 discoidal (third discoidal longest), 7 longer internal, 8 shorter internal spines, distal two internal longer spines enclose two smaller ones; claw groove basal; tibia with 12 external and 14 internal spines; metatarsus 1.7x longer than all other tarsal segments together. Middle and hindlegs: coxa shorter, femur a little longer than tibia in middle leg, hindfemur as equal as tibia, with genicular spines; metatarsus nearly as equal as all other tarsal segments together. Wings: longer than metasoma, forewing costal area opaque, broad, discoidal area semiopaque, anterior radial vein bifurcates distally, posterior radial vein bifurcates proximal to stigma; ulnare vein bifurcates; hind wing hyaline, venation less dense than forewing venation.

Metasoma: broader, posteriorly bluntly triangular with pubescence; cerci shorter with pubescence.

Material examined: Plesiotype: INDIA, Kerala, Malaparamba, 14-ii-98.
Vyjayandi M.C (DZCU).

Biology: Unknown.

Habitat: among vegetations, in less disturbed area.

Distribution: India, Bihar, Lakshadweep, Madhya Pradesh, Orissa, Uttar Pradesh, West Bengal, Indonesia, Borneo, Turkistan, Kalimantan, Western Asia.

Discussion: This species *Hierodula (Hierodula) tenuidentata* Saussure is closely related to *Hierodula (Hierodula) saussurei* Kirby in following characters: 1. Body robust, colour green. 2. Wider opaque costal area. 3. Blunt marginal spines on the forecoxa . 4. Pentagonal frontal sclerite. This species *Hierodula (Hierodula) tenuidentata* Saussure is different from *Hierodula (Hierodula) saussurei* in following characters: 1. Mesosoma, oval, stouter and robust; 2.5x longer than broad and margins parallel, in *Hierodula (Hierodula) tenuidentata* (mesosoma, elongated, sharply narrows posterior to supra coxal dialation, 5.7x longer than broad in *Hierodula (Hierodula) saussurei*). 2. Frontal sclerite 1.2x higher than broad in *Hierodula (Hierodula) tenuidentata* (frontal sclerite as high as broader in *H. (H.) saussurei* .

***Hierodula (Hierodula) ventralis* Giglio-Tos**

(Figs. 163-168) (Plate VIII Fig. 1)

Hierodula (Hierodula) ventralis Giglio-Tos. 1912. *Bull. Soc. Entomol.* 43: 82.**Plesiotype:** Male Body length 65 mm.

Colour: Pale green. Vertex dirty yellowish green at centre, laterally with testaceous tinge; eyes wood-brown dorsally, ventrally with black shades; ocelli shining lemon yellow; frontal sclerite and clypeus concolorous with vertex; labrum and gena moss green; antennal scape and pedicel concolorous with vertex, flagella testaceous; mesosoma greenish with inferior lateral sides testaceous streaks; sternum with brown stripe and 2 brown dots; forelegs more greenish than vertex; coxal spines marble; femur internally with a brown streak, external shorter, and internally tibia with spines black at tips only, longer internal spines dark brown externally and light green internally; metatarsus dirty yellowish green with jet black lower tips; middle and hind legs slightly testaceous; forewing costal area grass green; stigma yellow; anal membrane and discoidal area of both forewing and hind wing transparent. Metasoma testaceous with green cross bars.

Head: Thick, triangular 1.4x wider than high; vertex smooth, lateral lobes slightly pronounced; eyes globular laterally, ventrally subconical, emarginate; ocelli

larger, posterior ones slantingly placed; POL: OD: OOL = 8 : 5 : 10; antenna filiform, slender without setae; frontal sclerite pentagonal, superior border angular, 1.1x wider than high, bicarinate, inferiorly sinuate, disc depressed clypeus rhomboidal, carinated.

Mesosoma: Elongate; supra coxal dialation oval, with indistinct midlongitudinal carina, 4x longer than wide at supra coxal dialation; prozonal outer rim with indistinct denticles; metazona 3x longer than prozona. Forelegs: superior margin of coxa with four to five obtuse thick spines, outer surface ridged, inferior end not serrated; internal apical lobes slightly diverging; femur 1.2x longer than forecoxa, 2x longer than tibia, with 4 external, 4 discoidal (third discoidal spine longest), 7 longer internal, 8 shorter internal spines; tibia with 10 external and 14 internal splines; metatarsus as long as all other tarsal segments together; middle and hindlegs: coxa short, femur slightly shorter than tibia in midleg, longer than tibia in hindlegs; metatarsus nearly as long as all other tarsal segments together. Wings longer than metasoma, forewing with opaque, broad coastal area, anterior radial vein bifurcates distally, posterior radial vein bifurcates proximally and rebranches; hindwings hyaline, radial veins bifurcates and rebranches.

Metasoma: flat, broader towards posterior; cerci slightly elongated with pubescence.

Materials examined: Plesiotype: Male: INDIA, Kerala, Kovoov (Calicut), 9-iv-99, Vyjayandi. M.C ,(DZCU). Other materials examined: 1Male, INDIA, Kerala, Malaparamba, 9-ix-2000 , Sasikala (DZCU). 1Male, Kerala, Malaparamba, 15-ix-2000, Sumitha (DZCU). 1Male, Kerala, Kovoov, 15-ii-99 , Vyjayandi (DZCU). 1Male, Kerala, Calicut University Campus, 17-v-2000, Smitha (DZCU) 1Male, . Kerala, Cali. Uni. Campus, 12-iv-97, Suneetha (DZCU). 1Male, Kerala, Cali. Uni. Campus , 5-ix-99, Girish (DZCU) . 1Male, Kerala , Trissur, 4-ix-98, Usha. K.(DZCU) . 1Male, Kerala, Palakkad 11-i-2001, Vyjayandi M.C (DZCU). Kerala, Kannur, 11-iii-2000. Shija (DZCU) . Kerala, Calicut, 5-vi-2000, Jashy (DZCU) . Kerala, Palakkad, 11-ii-2000, Sheeja V.M.(DZCU) Kerala , Cali. Uni. Campus, 6-vi-2000 , Beena , (DZCU) .1 Female, Cali. Uni. Campus, 14-x-96 , T.C. Narendran (DZCU) . 1Male, Kerala, Ottakkandum (Kozhikode Dist.),16 -iv-99 , Amritha (DZCU) . Kerala, Wynad, 15-iii-99 Sheeja(DZCU). Kerala, Mankavu,6-vii-99, Deepa(DZCU). 1Female, Kerala, Parambikulam (Palakkad), 30-ix-95,C. Radhakrishnan (ZSI Calicut) Reg.No.83471 male, Kerala, Parambikulam Wild Life Sanctuary, 5-ix-95,P.M.Sureshan (ZSI Calicut), Reg.No.8267.

Biology: Seen feeding on butterflies . In laboratory this species even devour cockroaches. attracted to light.

Habitat: Seen among green vegetation .

Distribution: India, Kerala, Chandigarh, Madhya Pradesh, Maharashtra.

Discussion: This species *Hierodula (Hierodula) ventralis* Giglio-Tos comes nearer to *Hierodula (Hierodula) bipapilla* (Audinet-Serville) in the following characters:

1. General appearance and colour of the body .2. Structure and shape of the frontal sclerite. 3. Forewing costal area opaque and broad. This species *Hierodula (Hierodula) ventralis* differs from *Hierodula (Hierodula) bipapilla* in following characters : 1. In *Hierodula (Hierodula) ventralis* forecoxal superior margin with 5-6 obtuse spines (in *Hierodula (Hierodula) bipapilla* with 2-3 fore coxal spines) .2 . *H. (H.) ventralis* without a brownish green patch on the distal end of forecoxa (in *H. (H.) bipapilla* such a patch is present).

Subgenus *Hierodula (Rhombodera)* Giglio-Tos

Diagnostic Characters :

Body large, robust. Head thick, a little wider than high; eyes globular; frontal sclerite rhomboidal, superior apex with or without spine. Mesosoma with dialation extending from anterior to posterior tip, usually lateral lamina with denticles ; forelegs: coxal margin with obtuse spines. Metasoma flat, supraanal plate short, transverse; cerci long, conical.

Distribution: Oriental region, Australia.

Six species are known from India.

Key to Indian species of *Hierodula (Rombodera)* Giglio-Tos

1. Frontal sclerite superiorly with spine 2
 - Frontal sclerite superiorly without spine..... 4
2. Forefemur with three internal dark bands..... *H. (R) woodmasoni* Werner
 - Forefemur without any bands internally..... 3
3. Forecoxa with ten 10-12 blunt spines; a red shining blotch at base of forefemur..... *H(R) tectiformis* Saussure
 - Forecoxa with 6-9 blunt spines; base of the forefemur without any red blotch..... *H(R) crassa* Giglio-Tos
4. All larger internal spines and three discoidal spines entirely black..... 5
 - All larger internal spines and discoidal spines black at tips only
..... *H(R) dorina* Laid law
5. Metazona 2.5x as long as prozona; forefemur without brown bands.....
..... *H(R) fracticida* Wood-Mason
 - Metazona shorter; forefemur with brown bands..... *H(R) butleri* Wood-Mason

***Hierodula (Rhombodera) woodmasoni* Werner**

(Figs. 169-175) (Plate IX Fig. 1)

Hierodula (Rhombodera) woodmasoni Werner 1931. *Proc. Zool. Soc. London.*

1931. 1331. Holotype F. India, (BMNH).

Plesiotype: Female Body length 90 mm.

Colour: testaceous. Vertex testaceous with yellow patches; eyes fuscous dorsally, black ventrally; ocelli shining testaceous; frontal sclerite, clypeus, labrum, antenna concolorous with vertex. Mesosoma mid dorsally dark wood brown, lateral lamina fuscous with cream coloured dots; ventrally mesosternum yellowish brown with a black cross bar posteriorly; forelegs concolorous with mid dorsal part of mesosoma; coxal spines marble; femur with two indistinct fuscous cross bars externally, internally with black bands at distal end and claw groove, external spines creamy yellow with black tips; internal longer spines all jet black except last one, which is yellowish, discoidal spines and tibial spines, testaceous with black tips; trochanter creamy yellow; middle and hind legs testaceous to fuscous metatarsus with creamy patches; wings: forewing creamy yellowish with brown patches, stigma yellow, anal membrane subhyaline; costal area of hind wing subhyaline enfumated with brown patches; discoidal and anal area hyaline. Metasoma testaceous with fuscous cross bands, cerci testaceous.

Head: obtusely triangular, 1.3x wider than high; vertex smooth, lateral lower lobe pronounced; eyes emarginated, globular; ocelli large, median ocellus slanting; frontal sclerite rhomboidal, 1.5x wider than high, disc bicarinate, superior border with a central spine, superior border not angular, sinuate, inferior border wavy, laterally pointed; clypeus with tubercles; antenna slender, short, without setae.

Mesosoma: rhomboidal, not smooth, with bossess at central portion, laterally laminated, 1.6x longer than wide at supra coxal diation, with mid longitudinal carina, prozona oval, metazona 2x longer than prozona. Forelegs: coxa ridged outwardly with strong 6 marginal spines blunt at apex; inferior border serrated, internal apical lobes contiguous, trochanter broad, femur 1.2x longer than coxa and 2x longer than tibia with 4 external, 4 discoidal, internally longer, 8 shorter spines, distal two longer spines enclose two smaller ones; tibia with 11 external, and 13 internal spines metatarsus 2x longer than all other tarsal segments together. Middle and hind legs: slender, simple coxa short, both middle and hind femur with genicular spines, femur a little longer and stouter than tibia; metatarsus as long as second tarsal segment; wings: longer than metasoma, forewings semihyaline, costal area enfumated and densely reticulated, anterior radial vein bifurcates distally, posterior radical vein bifurcates proximally and rebranches, ulnare vein not bifurcating; hind wing costal area more enfumated, than discoidal area, posterior radial vein bifurcates, discoidal vein not bifurcating.

Metasoma: shorter than wings, broad at middle; cerci many segmented, slightly long, with pubescence.

Material examined: Plesiotype: Female: INDIA, Kerala, Trissur, Sholayar, 23-iii-1996, C. Radhakrishnan (ZSI Calicut) Reg. No. 8747.

Other Materials Examined: 1 female: Idamalayar, Kappayam (Idukki), 24-ix-99, P.M. Sureshan,(ZSI Calicut), Reg. No. 11, 124.

Biology: Unknown.

Habitat: Undisturbed Evergreen Forest in India.

Distribution: India, Madhya Pradesh, Meghalaya, Oriental Region.

Discussion: This species *Hierodula (Rhombodera) woodmasoni* Werner is closely related to *Hierodula (Rhombodera) crassa* Giglio-tos in following characters: 1. Laminated mesosoma . 2 .Spine on the frontal sclerite . 3. Denticulated margin of mesosoma . 4. Forecoxa with 6-9 conical spines. 5. Internal spines of forefemora black. However this species *Hierodula (Rhombodera) woodmasoni* Werner is different from *Hierodula (Rhombodera) crassa* Giglio-Tos in following characters: 1. Body size more than 80 mm in the case of *Hierodula (R.) woodmasoni* (50-60 mm in the case of *H. (R.) crassa* (2) margins of mesosoma highly denticulated in *Hierodula (Rhombodera) woodmasoni* (little denticulated in *H. (R.) crassa*).

Genus *Mantis* Linnaeus

Grillus(*Mantis*) Linnaeus 1758. Syst. Nat. 10:425. Type species

Mantis religiosa. Linnaeus.

Mantis Giglio-Tos 1927. Das Tierreich 50:405.

Diagnostic characters:

Body medium sized, slightly robust. Head small; eyes globular, projecting laterally; frontal sclerite 2x wider than high, superior border angular; antenna a little thicker than that of *Statilia* Stal; antennal toruli placed closer than in the case of *Statilia*; ocelli large. Mesosoma a little longer than forecoxa, shorter when compared to that of *Statilia*, supra coxal dialation less pronounced; forelegs slender, forecoxa with internal apical lobes divergent, without marginal spines; forefemur with 4 external and 4 discoidal spines, inner side with a yellow spot medially; claw groove placed at the middle of fore femur. Wings a little longer than metasoma.

Distribution: India, Asia, Europe, Africa, Australia.

Four species are known from India.

Key to Indian species of *Mantis* Linnaeus

1. Forecoxa internally with a black patch2
- Forecoxa internally without a black patch3

2. Forefemur with black patch*M. nobilis* Brunner
- Forefemur without black patch*M. religiosa* Linnaeus

3. Forefemur with black patch.....*M. indica* Mukherjee
- Forefemur without black patch.....*M. inornata* Werner

***Mantis religiosa* Linnaeus**

(Figs.176-184) (Plate VII Fig.4)

Gryllus (Mantis) religiosus Linnaeus, 1758, *Sys. Nat.* 10: p.426

Mantis religiosa ,Fuessly 1775 *Verz. Schweiz. Ins*, p.22

Mantis oratoria, Stall , 1813, *Represent spectres* , p. 53.t.17.f.64

Mantis capensis , Saussure, 1872 ,*ibid.* V.23 .p.46

Plesiotype: Male Body length 50mm.

Colour: Yellowish green. Head testaceous, with a transverse dirty yellowish green patch across vertex and eye, above this with a ferrugeneous thicker line; eyes testaceous with black patches; ocelli ferrugeneous; frontal sclerite, clypeus, labrum, mesosoma, legs and metasoma testaceous with green tinge; antennal scape and pedicel brown; flagella fuscous; forecoxa internally with yellow entrapped by black border, proximally with distal callous spots; all internal longer spines of forefemur jet black.

Head: triangular, 1.3 x wider than high, with five indistinct lobes; eyes globular, not much projecting; ocelli larger closely packed on platform; POL: OD: OOL= 8: 5: 8; frontal sclerite rhomboidal, convex inferiorly and conical at superior middle part and angular superio-laterally; superio-lateral most corners sharply conical, inferior lateral corners bluntly conical, disc carinated at sides, concave at middle; antenna filiform; clypeus carinated.

Mesosoma: slightly longer than forecoxa, 3.6 x longer than wide at supra coxal dialation and 5.5 x longer than wide at mid metazonal constriction, disc not flat, slanting, metazona 2.5x longer than prozona, prozona spatulate with supra coxal dialation and midmetazonal constriction not much pronounced, metazonal inferior margin arched. Forelegs: coxal disc not flat, with six to seven submarginal granules, internally with marble callous spots, apical lobes divergent; femur not foliaceous, slender; claw groove middle, with 4 external and 4 discoidal (third longest) spines; internally with 6 longer spines alternating with 6 shorter spines, femur 1.2 x longer

than coxa and nearly 3x longer than tibia; tibia with seven external and eleven internal spines, tibia 1.2x longer than metatarsus. Middle and hindlegs: slender, without lobulation, coxa broader and shorter than femur; femur 3.3x longer than coxa, somewhat equal in length with tibia; tibia 3.2 x longer than metatarsus, metatarsus as long as all other tarsal segments together. Wings: both wings hyaline, costal area of forewing opaque; costal vein bifurcates distally; post radial vein bifurcates at middle, lower branch again bifurcates distally in both forewing and hindwing .

Metasoma: a little shorter than wings. Supra anal plate elongated; cerci many segmented.

Biology: Unknown.

Habitat: Usually seen at fringes of paddy field.

Distribution: India, Kerala, Karnataka, Madhya Pradesh, Manipur, Uttar Pradesh, West Bengal

Materials Examined: Plesiotype: INDIA, Kerala, Palghat, 25-x-1998 Francy .K,(DZCU). Other materials examined: 1Male, INDIA, Kerala, Thrissur, 20-v-98 Usha. K,(DZCU), 2females, INDIA, Kerala, Thrissur, 11-iii-2001, 2-v-2001 Usha. K (DZCU) . 1Male, INDIA, Kerala, Cali. Uni. Campus, 3-iii-2001 , T.C.Narendran, (DZCU).

Variation: (Plate VII Fig.2) *Mantis religiosa* Linnaeus shows two types of colouration: 1. forewings green with ferrugeneous superior border as in Plesiotype and 2. forewings light yellowish brown with dark brown border. In latter case, 3 varieties

of specimens are seen ,with earth brown body and theproximal side of forecoxa inside with

1. yellow patch bordered by black and with callous spots.
2. black spot on the forecoxa in the same position as in the above case and with callous spots.
3. a) forecoxa inside with dark brown colouration and without callous spots.
b) Metasoma with blackish brown patch ventrally, more shorter than wings compared to other specimens.

Type	Body colour	Fore coxa inside
1. Plesiotype	Green	Yellow entrapped within black; with callous spots
2. Variation I	Earth brown	"
3. Variation II	"	Black patch only;with callous spots
4. Variation III	"	Brown shade;without callous spots

Discussion: This species *Mantis religiosa* Linnaeus closely related to *Mantis nobilis* Brunner, in following characters: 1. Frontal sclerite transverse with upper angular margin. 2. Larger internal spines of forefemur black. *Mantis religiosa* differs

from *Mantis nobilis* in following characters: 1. Internal apical lobes of forecoxa divergent in *Mantis religiosa* (internal apical lobes of forecoxa contiguous in *Mantis nobilis*). 2. Forefemur without any black spot in *Mantis religiosa* (forefemur internally with a large shining black patch extending upto base of second discoidal spine in *Mantis nobilis*).

Genus *Plistospilota* Giglio-Tos

Plistospilota Giglio-Tos 1911 *Bull. Soc. Entomol. Ital.* 42 6 Type species

Plistospilota validissima (Gerstaecker).

Diagnostic Characters:

Body large. Head flat, smooth; eyes globular, frontal sclerite a little wider than high, superior border slightly arched, disc carinated . Mesosoma strongly built, supra coxal dialation oval; metazona longer than forecoxa; forelegs simple, slender, rectangular in cross section, internal apical lobes contiguous, forefemur with 4 external, 4 discoidal, spines; claw groove middle; tibia with 10-11 external spines; metatarsus as long as all tarsal segments together; hindwing discoidal area traversed with alternate yellow and black bands, anal area smokey.

Distribution: Oriental Region, Africa .

One species occur in India.

***Plistospilota nova* Beier**

(Figs.185-190) (Plate IX Fig.2)

Plistospilota nova Beier 1930 b *Ann. Mag. Hist.* (10) 6 452 Holotype F India

Cachar (BMNH)

Plesiotype: Male Body Length 84mm.

Colour: Dirty greenish yellow. Vertex dirty greenish yellow with vague black marks; eyes black with greenish yellow patch; ocelli ferrugeneous peripherally, black at center; antenna, frontal sclerite, clypeus, labrum, mesosoma and forelegs concolorous with vertex; two distinct black stripes on frontal sclerite; all forefemoral spines black at tips only; mid and hind legs testaceous; forewing costal area light green, discoidal area testaceous, anal membrane enfumated; hindwing costal area light brown, discoidal area with transverse dark brown area alternates with creamy yellow transparent areas, base with dark brown patch, anal area smokey. Metasoma fuscous.

Head: flat; vertex smooth, lateral lobes distinct, 1.6 x wider than high; eyes round dorsally, slightly oblong ventrally; ocelli conspicuous, kept elevated from vertex, POL:OD:OOL= 8:3:8; frontal sclerite rhomboidal, 1.5x wider than high, slightly arched superiorly, carinated; antenna filiform short, slender, non setaceous.

Mesosoma: more than twice longer than forecoxa, robust, supra coxal dialation oval, 4x longer than wide at supra coxal dialation, with finely denticulated margin, prozona spatulate with longitudinal groove; metazona 3x longer than prozona, mid dorsal carina less pronounced. Forelegs: coxa slender, rectangular in cross section, outer margin denticulated, internal apical lobes converging; femur with 4 external, 4 discoidal (third longest), internally 7 longer, 8 shorter spines distally two longer spines enclose two shorter spines, claw groove middle, with basal row of denticles; tibia somewhat compressed, with 7 external, 9 internal spines, metatarsus as long as all other tarsal segments together. Middle and hindlegs slender, elongated, midlegs slightly shorter than hindlegs; metatarsus as long as all tarsal segments together. Wings slightly shorter than metasoma, forewing costal area opaque, discoidal area subopaque, anterior radial vein bifurcates distally, posterior radial vein bifurcates at middle, branches and rebranches, all other veins traverse parallel; hindwings with costal area subopaque, discoidal area transparent, enfumated, anterior radial and posterior radial veins bifurcate.

Metasoma: slender, elongated, with a few setae middorsally, supra anal plate elongated, with obtuse triangular tip; cerci long and pointed.

Materials examined: Plesiotype: Male, INDIA, Kerala, Trivandrum, Bonacaurd , 26-iii-1992, K.C.Gopi (ZSI Calicut), Reg. No. 5850.

Biology : unknown.

Habitat: inner core of Tropical Rain Forest.

Variation: Black spot between base and claw groove of forefemur absent .

Distribution: India, Assam, Kerala.

Discussion: Only one species of *Plistopilota*, viz. *P. nova* Beier is reported from India, from Assam. This is a new report from Kerala.

Genus *Statilia* Stal

Statilia Stal 1877. *Bih. K. Svenska Ventensk Akad Handl* 4(10):36. Type Species

Statilia nemoralis(Saussure)

Diagnostic Characters:

Body somewhat robust; eyes globular laterally; ocelli small; antenna slender, non setaceous; antennal toruli wide apart; frontal sclerite transverse, not narrow, 2x wider than high. Mesosoma slender, longer than forecoxa; laterally denticulated; supra coxal dialation well pronounced. Fore legs slender, coxa with marginal spines, internal apical lobes contiguous; forefemur with 4 external and 4 discoidal spines, inner disc with pale yellow and black patches; claw groove placed distally. Wings as long as metasoma . Supra anal segment short.

Distribution: Asia, Oriental region, New Guinea, Africa.

Three species are known from India

Key to Indian species of *Statilia* Stal

1. Prosternum at the coxal origin black.....*S. maculata*(Thunberg)
- Prosternum at the coxal origin not black.....2

2. Prosternum posteriorly with a black patch*S. apicalis*(Saussure)
- Prosternum without a black patch posteriorly.....*S. nemoralis*(Saussure)

***Statilia maculata* (Thunberg)**

(Fig. 192-196)

Mantis maculata Thunberg 1784 *Nov. Ins. Spec.* 3:61

Pseudomantis maculata Hanni, Saussure 1871 *Mem. Soc. Geneva*, v.21 p.37, 276

Statilia maculata Bolivar 1897. *Ann. Soc. Entomol. France* 66:309

Statilia haanii Giglio. Tos. 1912. *Bull. Soc. ent. Ital.* v.43 p.6

Plesiotype: Male Body length 53 mm.

Colour: fume brown. Head: testaceous; vertex with black transverse mark across entire length, middorsally below this passes a transverse fuscous line

across entire length, vertex appears striped in black and brownish black; eyes testaceous with black patches; ocelli ferruginous, somewhat more brown with black stripes; frontal sclerite testaceous with faint black irregular shades darkening towards lower to middle portion of disc in a wavy manner, posterior lateral corners jet black; clypeus and labrum testaceous with faint blackish brown shades; antenna light earth brown with dark brown tinge, darker towards tip, bristles brown. Mesosoma: testaceous, mid dorsal carina dark brown, disc with fuscous irregular patches and spots; anteriorly metazonal sternum at coxal origin black which becomes faint blackish brown posteriorly; forelegs: coxa dorsal side testaceous, proximal portion with a black patch, with 6-7 marble tubercles; femur dorsally testaceous with light brown shades scattered through out dorsal disc, ventrally brown with a jet black patch proximally, distal to it with golden yellow clear patch; superior to golden yellow area with a dark brown patch, a jet black streak borders claw groove passes distally, at base of internal spines and ends apically; distal disc of femur with a brown patch; internal, external and discoidal spines of femur light brown with black tips; tibia testaceous with dark fuscous indistinct bands externally and internally; tibial spines with black tips; distal end of tibia with fuscous streak continuous towards the tibial claws inferiorly, metatarsus and tarsal segments black at lower border, upper border light brown; middle and hind legs testaceous with yellowish patches, ventrally coxa and femur with dark brown minute dots in light brown background; tibia light brown compared to coxa and femur; metatarsus concolorous with tibia; other tarsal segments black; wings: enfumated; costal area and anal area of forewing opaque, discoidal

area smokey brown with patches, stigma yellow; hind wings more transparent than forewings, smokey. Metasoma and cerci testaceous.

Head: triangular, 1.7x wider than high; vertex convex, without any protuberances, thrown into 5 lobes separated by much shallow grooves, lateral most ones somewhat prominent; eyes emarginate, globular, projects laterally; ocelli closely placed and larger compared to *S. nemoralis* and kept raised on a platform; POL:OD:OOL= 1:1:2; antenna slender, filiform with sparsely distributed setae; frontal sclerite rhomboidal, not spiniform, superiorly angular and laterally sinuate, lower lateralmost edges with conical projections; clypeus carinated midlongitudinally.

Mesosoma: not flat, slanting, 5x longer than wide at supra coxal dialation and 9x longer than wide at proximal metazonal constriction; prozona anteriorly spatulate, with midlongitudinal carina, sides with tubercles, larger tubercles distributed at prozonal lateral edges; prozonal bosses larger; metazona posteriorly weakly arched, 3x longer than prozona. Forelegs: slender, coxa not flat with middorsal tuberculated ridge, ventrally submarginal area with 6-7 large well pronounced tubercles, internal apical lobes contiguous; trochanter well formed; forefemur not foliaceous, slender without dorsal or ventral ridges, with 4 external, 4 discoidal, 6 longer internal, 8 smaller internal spines, distal two longer spines enclose 3 smaller spines; femur with 4 genicular spines apically; tibia with 10 external and 11 internal spines gradually becoming elongate distally; femur 1.3x longer than coxa and 3.2x longer than tibia; tibia 1.2x longer than metatarsus; middle and hind legs: coxa short;

femur 8x longer than coxa; femur nearly as long as tibia; tibia 3.2x longer than metatarsus. Wings: both wings non-truncate with conical endings; forewing costal area opaque, discoidal area semihyaline, radial vein posteriorly bifurcated, ulnare vein bifurcates middle and distal branch again bifurcates; hindwings semihyaline, anterior radial vein bifurcates.

Metasoma: as long as wings. Supra anal plate short; posteriorly metasoma obtusely conical with 9 segmented cerci and with pubescence.

Materials examined: Plesiotype: 1 male, INDIA , Kerala, Thenhipalam (Malappuram), 2-vi-1999, T. C. Narendran (DZCU). Other materials examined: 1 male: INDIA, Kerala, Muthanga (Wynad dist), 6-xi-99, Vyjayandi (DZCU) 1 male: INDIA, Kerala Thrissur, 29-xi-98 K Usha (DZCU). 1 male: INDIA, Kerala, Cali. Uni. Campus, 18-iv-2000, T.C. Narendran (DZCU). 1 male: INDIA, Kerala, Thrissur 14-v-98 Vyjayandi (DZCU). 1 male: INDIA, Kerala, Kooror (Kozhikode dist) 18-IV-2001 Vyjayandi (DZCU). 1 male: INDIA, Kerala, Pulpally (Wynad dist) 15-v-99 Vyjayandi (DZCU) . 1 female: INDIA, Kerala, Kondotty (Malappuram dist), 16-iv-98, Vyjayandi (DZCU) . 1 male: INDIA, Kerala, Kannur, 6-iv-2000, Seena Sadanandan (DZCU). 1 male: INDIA, Kerala, Chendurony, Thrissur, 18-x-2000, Shamsudin (KFRI, Peechi)

Biology: Unknown

Habitat: Undisturbed bushes

Distribution: India (Kerala, Arunachal Pradesh, Assam, Sikkim, West Bengal, Bihar, Madhya Pradesh)

Mesosoma: 5x longer than broad at supra coxal dialation, 8x longer than broad at mid metazonal constriction; prozona spatulate with weak poserior mid carina, elevated in middle to form bosses; metazona dorsally thrown into 2 pairs of smaller bosses, metazona constricted at middle, arched inferiorly, midlongitudinally with a carina; lateral sides of prozona and metazona denticulated. Forelegs: coxa simple, mid dorsally ridged with 5-6 sharp spines, internal apical lobes contiguous; femur slender, simple with 4 external, 4 discoidal, 6 longer internal, 8 shorter internal spines, distally 2 longer internal spines enclose 3 shorter spines, femur 1.1x longer than coxa, 2.2x longer than tibia; tibia with 12 internal(gradually elongating towards tip) and 8-9 external shorter spines, nearly 2x longer than metatarsus; metatarsus as long as all other tarsal segments. Middle and hind legs: slender, simple, with sparse setae; hind coxa short; femur slender, 4x longer than coxa, as equal as length tibia; tibia 4x longer than metatarsus; metatarsus short, as long as all other tarsal segments together. Wings: forewings opaque, radial veins posteriorly branches thrice; ulnare vein branched at middle, hindwings semihyaline; anterior radial vein and posterior radial vein bifurcate.

Metasoma: fusiform, tuberculated, as long as wings; supra anal plate oblong, short; cerci short with pubescence.

Biology: Unknown.

Habitat: Undisturbed bushes.

Materials examined: Plesiotype: 1 female, INDIA, Kerala, Thrissur, 11-ix-99, K Usha(DZCU). Other material examined: 1 female, INDIA , Kerala, Cali.Uni. Campus, 18-v-99, T. C. Narendran (DZCU) .1 male,Kerala,Cali.Uni.Campus,23-viii-2001,Vyjayndi(DZCU).1female,Kerala, Kasargod, 25 -v-2001, Balamony,(DZCU).

Discussion: This species *Statilia nemoralis* (Saussure) is similar to *Statilia maculata* (Thunberg) in the following characters: 1. Position of claw groove on femur (upper one third ventrally) 2. Black patch on the inner proximal portion of forecoxa. 3. Inner middle disc of femur having rectangular jet black patch; distal to this golden yellow patch. The species *S.nemoralis* differs from *S.maculata* in the following characters: 1. Colouration of the body straw yellow with grass green streaks in *S.nemoralis* (body smokey, enfumated in *S.maculata*) 2. Metazonal sternum without black patch in *S.nemoralis* (above patch is present in *S.maculata*) 3. Ocelli smaller, widely separated, in *S.nemoralis* (larger, closely packed, in *S.maculata*) 4. POL:OD:OOL = 10:3:8 in *S.nemoralis* (POL:OD:OOL = 1:1:2 in *S.maculata*) 5. Submarginal spines of forecoxa 5-6 and sharp in *S.nemoralis* (6-7, blunt spines in *S.maculata*).

Key to Indian species of *Tenodera* Burmeister

1. All the spines of forefemur black at tips only.....2
 - Colour of spines of forefemur not as above, first three discoidal, larger internal spines of forefemur entirely black or internally black.....4

2. Hind wing with deep reddish brown patch at base.....*T. aridifolia* (Stoll)
 - Hind wing without deep reddish brown patch at base.....3

3. Forecoxa with 13-14 minute spines at its superior border.....
 -*T. angustipennis* (Saussure)
 - Fore coxa without spines, only with fine serrations.....*T. fasciata*(Oliver)

4. Trochanter reddish brown.....*T. blanchardi* Giglio-Tos
 - Trochanter not reddish brown.....5

5. Fore coxa smooth, first three discoidal and larger internal spines of fore femur entirely black.....*T. bokiana* (Giglio-Tos)
 - Fore coxa finely denticulated; first three discoidal and larger internal spines of fore femur black internally only.....*T. superstifiosa* (Fabricius)

***Tenodera superstitiosa* (Fabricius)**

(Figs.202-207)

Mantis supersttiosa Fabricius 1781 *Spec. Ins.* 1:348 Type Africa(ZMHU)*Tenodera superstitiosa* Stal. 1871. *In Oliv. Ak. Farh.* V.28. p. 390**Plesiotype:** Male Body length 70 mm.

Colour: straw yellow with greyish brown tinge. Vertex greyish brown with fuscous tinge; eye and labrum concolorous with vertex; ocelli ferrugeneous; median ocelli black at apex; antennal scape and pedicel fuscous, flagella black towards apex; frontal sclerite greyish brown with black dots. Mesosoma concolorous with vertex, supra coxal dialation fuscous; legs earth brown; all spines of forefemur and foretibia black at apex only (except first three discoidal spine and longer internal spines which are black internally); metatarsus black internally; all other tarsal segments completely black; wings subhyaline, tanned straw yellow; forewing border dark brown. Metasoma fuscous.

Head: small, 2.6 x wider than high; vertex convex at centre, lateral lobes distinct; eyes globular dorsally, a little oblong ventrally; ocelli conspicuous, large, closely placed; POL:OD:OOL=7: 5: 7; frontal sclerite transverse, superiorly angular, inferiorly arched, 3.6x wider than high; disc flat, depressed, not carinated; antenna

filiform, slender, longer than body, with a pair of stiff hairs on each segment; clypeus a little projecting.

Mesosoma: slender, more than 2x longer than forecoxa, supra coxal dialation well pronounced, 10x longer than wide at supra coxal dialation; prozona spatulate; metazona prismatic with strong middorsal carina, 5.2x longer than prozona. Forelegs: simple, slender, elongate, coxa with longitudinal carina middorsally, superior border with 3-4 small spines, internal apical lobes contiguous, inferior border slightly denticulated; femur with sharp, elongated 4 external, 4 discoidal and 15 internal (6 longer and 9 shorter) spines, distal two longer internal spines enclose four shorter spines, 1.3x longer than coxa and 3x longer than tibia; tibia a little longer than metatarsus; with 9 external and 13 internal spines, metatarsus as long as all other tarsal segments together; middle and hind legs elongated, delicate, coxa short; femur as long as tibia; metatarsus as long as all other tarsal segments together. Wings subhyaline, subconical at tips; forewing with reticulate venation, superior border opaque with transverse veins, without setae; costal and anterior radial veins bifurcate proximally; posterior radial vein bifurcates and branches twice proximally.

Metasoma: elongated, as long as wings, slender; supra anal plate triangular.

Biology: Unknown.

Habitat: Seen at interior dense forests, totally undisturbed areas like tropical rain forests and reserve forests.

Materials examined: Plesiotype: male INDIA, Kerala, Pooyamkutty(Ernakulam), 22-xi-1999, P.M Sureshan (ZSI Calicut) Reg no.11165. Other materials examined :1 male, INDIA, Kerala, Pamba (Pathanamthitta), 22-ii-99, P.M. Sureshan(ZSI Calicut)Reg.no.10027.

Distribution: India, (Kerala, Bihar, Punjab, Uttar Pradesh), Andamans, Africa.

Discussion: This species *Tenodera superstitiosa* (Fabricius) is closely related to *Tenodera bokiana* (Giglio-Tos) in the following characters: 1. Antenna slender, black except at the base. 2. Mesosoma long, slender. 3. discoidal and longer internal spines of the forefemur black. This species *Tenodera superstitiosa* (Fabricius) is different from *Tenodera bokiana* (Giglio-Tos) in the following characters: 1. forecoxa not smooth, denticulated along middorsal ridge, superior border with 3-4 minute spines in *Tenodera superstitiosa* (coxa smooth in *Tenodera bokiana*) . 2. Forefemur without black patches in *T. superstitiosa* (Forefemur with two black patches, one on femoral brush and the other in front of claw groove in *T. bokiana*). 3. First three discoidal spines black internally in *T. superstitiosa* (First three discoidal spines entirely black in *T. bokiana*)

Tribe Miomantini

Body usually brown; frontal sclerite narrow; wings shorter than metasoma; hind wings mostly with spots.

Seven genera occur in India.

Key to Genera

1. Fore femur with 5 external spines..... *Iris* Saussure
- Fore femur with 4 external spines..... 2

2. Eyes round..... 3
- Eyes conical..... 6

3. Occiput produced on each side into a flat round lobe..... *Indothespis* Werner
- Occiput not produced into flat round lobe..... 4

4. Internal apical lobes of forecoxa contiguous..... *Pararivetina* Beier
- Internal apical lobes of forecoxa divergent..... 5

5. Supra anal plate as long as broad with triangular tip..... *Deiphobe* Stal
- Supra anal plate short round at tip..... *Arria* Stal

6. Supra anal plate as long as broad.....*Diephobella* Giglio-Tos
 - Supra anal plate longer than broad.....*Rivetinula* La Greca

Genus *Deiphobella* Giglio-Tos

Deiphobella Giglio-Tos 1916. *Bull. Soc. Entomol. Ital.* 47:26.

Type species *Deiphobella laticeps* (Wood-Mason).

Diagnostic characters:

Head wide and flat; eyes conical laterally; antenna slender, non setaceous; frontal sclerite narrow, superior border arched; vertex with its upper edge extending over the eyes. Mesosoma slender, prozona spatulate; metazona much longer than forecoxa; forecoxa with internal apical lobes divergent; forefemur with 4 external and 4 discoidal spines; claw groove middle; middle and hindlegs with spines; cercei long.

Distribution: Oriental region, (India, Sri Lanka).

Key to Indian Species of *Deiphobella*

- Forecoxa internally granulated; a black transverse band on the frontal sclerite..... *D. laticeps* (Wood-mason)
- Forecoxa not granulated; frontal sclerite without transverse black band
.....*D. gardeneri* Werner

***Deiphobella laticeps* (Wood-Mason)**

(Figs 208-213) (Plate IX Fig.3)

Ficheria laticeps Wood-Mason 1876. *Ann. Mag. Nat. Hist.* 4 (Syn Type) India. F:

India: Bangalore.

Deiphobe laticeps Wood-Mason 1878. *Proc. Zool. Soc. London.* 38:580

Eremoplana laticeps Kirby 1904. *Cat. Orth. Brit. Mus.* 1:266

Deiphobella laticeps Giglio-Tos. 1927. *Das Tierreich.* 50:490

Plesiotype: Female body length 94 mm.

Colour: Colour of rotten leaves. Head testaceous to fuscous; eyes testaceous with fuscous markings; ocelli ferrugeneous with black rim; antenna concolorous with eye; frontal sclerite brown with a black band transversely passing across the eyes;

clypeus concolorous with frontal sclerite; labrum testaceous with black dots. Mesosoma testaceous with two black longitudinal lines on the metazona, lateral denticles fuscous to black; mesosternum black at the coxal origin, other parts testaceous; legs clay brown with fuscous indistinct spots; all spines of femur and tibia black at tips only; forewings semiopaque, colour of dried leaves; anal segments black; hindwing faint black with creamy white spots distally, costal area ferruginous. Metasoma fuscous.

Head: flat and wide, 2.3x wider than high; vertex smooth, lobes not distinct, anteriorly depressed, ocelli placed on elevated platform; eyes conical laterally, without spine; antenna filiform, slender, thin, nearly as long as mesosoma, not setaceous; frontal sclerite transverse, 6x wider than high, placed at right angle to clypeus, superior border sinuate, inferior border almost straight, disc not carinated.

Mesosoma: much elongated than forecoxa, supra coxal dialation well marked, 7x longer than wide at supra coxal dialation, with two lateral carina and weak middle carina(tricarinate), sides denticulated; prosternum denticulated; prozona spatulate; metazona 3.6x longer than prozona. Forelegs: simple, slender; coxa triangular dorsally, flat ventrally, margin and disc denticulated, internal apical lobes divergent; femur 1.3x longer than coxa and 2.3x longer than tibia, with 4 external, 4 discoidal(third one 2x longer than second, fourth smallest, first shorter than second), 7 longer internal and 8 shorter internal spines(distally 2 longer spines enclose 3 shorter ones); all spines placed equally spaced at distal half of femur(space between internal

and external row of spines without any denticles or weak bristles), distal tip with 2 genicular spines, disc with a row of minute denticles externally; tibia with 8 external and 16 internal spines; metatarsus a little longer than all other tarsal segments together. Middle and hind legs simple, elongated, midlegs a little shorter than hind legs; femur and tibia nearly of same length; metatarsus nearly as long as all other tarsal segments together. Wings: both wings shorter than metasoma, forewing leathery, posterior radial vein bifurcates twice proximally; hindwings sub hyaline, posterior radial vein trifurcates.

Metasoma: elongated, slender; with triangular supra anal plate; cerci multi segmented.

Biology: Unknown.

Habitat: Undisturbed areas

Materialsexamined: Plesiotype: INDIA, Kerala, Cali.Uni.Campus, 11-iii-1997, Pookoya(DZCU).

Distribution: India,(Kerala, Karnataka), Sri Lanka.

Discussion: This species *Deiphobella laticeps* (Wood-Mason) is closely related to *Deiphobella gardneri* Werner in the following characters: 1. Head wide. 2. Eyes laterally conical . 3 Frontal sclerite narrow; superior border hardly arched. 4. Mesosoma slender. This species *Deiphobella laticeps* Wood-Mason is different from *Deiphobella gardneri* Werner in the following characters: 1. Frontal sclerite with black

transverse band in *D. laticeps* (without black transverse band in *D. gardeneri*). 2. Prozona ventrally granulated in *D. laticeps* (without prozonal granulation in *D. gardeneri*). 3. Forecoxa granulated inferiorly in *D. laticeps* (forecoxa not granulated in *D. gardeneri*).

Genus *Iris* Saussure

Iris Saussure 1869. *Mitt. Schweiz. Entomol. Ges.* 3:56 Type species

Iris oratoria (Linnaeus).

Diagnostic characters:

Body slender. Head large; eyes globular, large; vertex 5 lobed, dorso laterally extending above eyes; antenna slender; frontal sclerite more than twice as broad as high. Mesosoma slender, a little longer than forecoxa; forefemur with 5 external and 4 discoidal spines; middle and hindlegs simple, long; forewings short; opaque in female, long and subhyaline in male; hindwings brightly coloured, shortened in female. Metasoma fusiform. Supra anal plate bluntly triangular .

Distribution: Asia, Europe, Africa, America.

Key to Indian Species of *Iris* Saussure

1. Mesosoma in female denticulated.....2
 - Mesosoma in female non denticulated.....*I. nana* Uvarov

2. Hindwing with a large fuscous blotch on discoidal area
 - *I. orientalis* Wood-Mason
 - Hindwing with rows of concentrically arranged series of 3-4 black blotches.....*Iris keralensis*. sp. nov

Iris keralensis sp. nov

(Figs.214-220)

Holotype: Female body length 34 mm

Colour: Green with testaceous tinge. Vertex testaceous, occiput black; eyes black, testaceous inferiorly; ocelli orangish brown; frontal sclerite testaceous with fuscous tinge; antenna proximally testaceous, distally fuscous; clypeus and labrum concolorous with frontal sclerite; mesosoma testaceous with oblique black streak at prozona; metazonal sternum posteriorly with fuscous band across; forecoxa earth brown inferiorly and superiorly with ferrugeneous longitudinal patch; forefemur and foretibia earth brown externally, internally with fuscous longitudinal streak; all spines of

forefemur and foretibia yellow to testaceous with black tips; middle and hind legs testaceous; metatarsus light earth brown with green tinge; forewing leathery green and slightly testaceous, with fuscous patch at distal end; hind wing yellowish orange with distal two black spots at apex and concentrically arranged nine series of 3-4 black spots (not of same size). Metasoma testaceous.

Head: 1.3x wider than high; vertex smooth, only lateral lobes prominent, without any tubercles or projections; eyes globular; ocelli very small. POL:OD:OOL = 10:1:10; antenna slender, filiform, without setae; frontal sclerite spiniform, bituberculated, 2.5x longer than wide.

Mesosoma: 1.4x longer than forecoxa and as long as forefemur, 2.4x longer than wide at supra coxal dialation; supra coxal dialation oval; prozona bluntly spatulate; metazona 1.8x longer than prozona; metazonal and prozonal lateral sides with dentacles; forecoxa with denticulated ridge externally, superior margin with 7 minute spines, inferior end slightly denticulated. Forelegs: forefemur not foliaceous, 1.3x longer than coxa, 2.12x longer than tibia, with 5 long and sharp external, 4 discoidal, (third one longest), internally 6 longer and 8 shorter spines, distal two longer spines enclose three shorter spines; tibia with 6 distally placed external spines, (wide gap between first and second spine), distal most spine longer and stouter; internally foretibia with 12 spines; claw sharp and curved; metatarsus as long as all other tarsal segments. Middle and hind legs: midleg shorter than hindleg, both cases coxa short, femur stouter than tibia, slightly broader at base; mid and hind tibiae as

long as their femora; metatarsus as long as all other tarsal segments together. Wings: both wings shorter than body; forewings leathery and opaque; costal area wide, oblong, post radial vein bifurcates, ulnare vein branches twice proximally; hindwing fan shaped and semicircular.

Metasoma: fusiform, lower one third portion exposed; supra anal plate short and triangular; cerci short.

Biology: Unknown.

Habitat: Undisturbed Evergreen Forests or Deciduous Forests.

Materials examined: Plesiotype: Female, INDIA, Kerala, Wynad, 11-ix-1999, Joshila(DZCU). Other materials examined: 1 male INDIA, Kerala, Malayattoor (Evergreen forest, Emakulam), 15-ix-99, P. M Sureshan (ZSI Calicut, Reg. No. 11233).

Distribution: India, Kerala, Himachal Pradesh, Rajasthan, Indonesia, Java.

Discussion: This species *Iris keralensis* sp. nov. is similar to *Iris nana* Uvarov in the following characters: 1. Slender body . 2. Eyes round. 3. Mesosoma longer than forecoxa . 4 Forefemur with 5 external and 4 discoidal spines. 5. Middle and hind femora and tibia simple . 6 Short opaque forewing and coloured hind wing with fuscous to black blotch . 7 Short triangular supra anal plate. 8. Bituberculated frontal sclerite. But this species *Iris keralensis* sp. nov. differs from *Iris nana* Uvarov in following characters: 1. Mesosoma denticulated in *Iris keralensis* sp. nov. (Mesosoma smooth in *Iris nana*) . 2 . Foretibia with 6 external spines, arranged

with wide gap between first and second and sixth stouter in *I. keralensis* sp. nov. (Fore tibia with 9 external spines in *I. nana*.)

This species *Iris keralensis* sp. nov is similar to *Iris Orientalis* Wood-Mason in the following characters: 1. Presence of denticulated mesosoma. 2, Spinules on the forecoxa (3) Metazona a little shorter than forecoxa. However this species *I. keralensis* sp. nov differs from *I. orientalis* in the following characters: 1 Foretibia with 6 external spines in *I. keralensis* sp. nov (foretibia with 11-12 external spines in *I. orientalis*) . 2 Hind wing with 2 large black oval blotches at the anterior periphery, below concentrically arranged 9 series of 3-4 black large to small blotches in *I. keralensis* sp. nov (Hindwing with a large violet fuscous blotch, 4-5 concentric rings of same colour gradually faded peripheraly in *I. orientalis*).

Subfamily Schizocephalinae

Diagnostic characters:

Body stick like, slender, long. Head narrow, long; eyes conical, anteriorly pointed; frontal sclerite much higher than wide. Mesosoma much elongated, slender; forelegs long, slender, forefemur with 4 external, 3 discoidal spines, all spines placed at distal most end; foretibia short and compressed; wings : short and leathery ,in female, long and semi transparent in males. Metasoma slender, supra anal plate longer than broad.

Genus ***Schizocephala*** Audinet-Serville.

Schizocephala Audinet-Serville 1831 *Ann. Sci. Nat.* 22 55 Type species

Schizocephala bicornis (Linnaeus).

Diagnostic characters:

Body very long, slender. Head long; eyes conical dorsally, terminating into spiniform process; vertex lobbed apically; frontal sclerite much higher than wide, with a median dorsal and two lateral grooves; antenna thick at base sharply tapers terminally. Mesosoma long, slender; with less prominent supra coxal dialation; forelegs long, slender, claw groove distally placed on forefemur; forefemur 4 external, 3 discoidal spines. Metasoma slender; supra anal plate triangular and carinated.

***Schizocephala bicornis* (Linnaeus)**

(Figs. 221-226) (Plate VI Fig.4)

Grillus (Mantis) bicornis Linnaeus 1758 *Syst. Nat.* 1 (10) 426 Holotype :

India .

Mantis oculata Fabricius 1781 *Spec. Ins.* 1 348.

Schizocephala striata Audinet - Serville 1831 *Ann. Sci. Nat.* 22 56 .

Schizocephala bicornis Giglio-Tos 1927 *Das Tierreich* 50 237.

Plesiotype: Female: Body Length 125mm

Colour: Straw yellow with green tinge. Vertex golden yellow; eyes glossy golden yellow; antenna, frontal sclerite, clypeus concolorous with vertex. Mesosoma, legs and metasoma straw yellow with green tinge; all spines of forefemur black at tips.

Head: 1.8x wider than high, vertex trapezoid, anteriorly bifid; eyes conical, pointed towards apex; antenna filiform, thick at base, flagellum tapers distally; frontal sclerite pentagonal, 3x higher than wide, medianly grooved, superior edge truncate.

Mesosoma: elongated, slender, supra coxal dialation weak, lateral border denticulated, prozona spatulate, metazona 4.8 x longer than prozona. Forelegs elongate, coxa a little longer than femur, internal apical lobes divergent; femur 5 x longer than tibia, with 4 external, 3 discoidal (second spine 3 x longer than first), internally 4 long, 7 short spines, all spines at distal most end of femur; claw groove distally placed; tibia with 5 external and 9 internal spines; metatarsus a little longer than all other tarsal segments together; middle and hindlegs: coxa short, femur as long as tibia in midlegs, tibia shorter than femur in hindlegs, metatarsus nearly 2x longer than all other tarsal segments together. Wings: short, leathery, reaches upto second metasomal segment.

Metasoma: slender, much elongated; supra anal plate elongated, triangular, cerci long.

Materials examined: Plesiotype female, INDIA, Kerala, Cali. Uni. Campus, 15-iii-1998, T.C Narendran (DZCU). Other materials examined: 1Male ,INDIA, Kerala, Madayippara, (Kannur), 10-iv-99, Vjyayandi (DZCU). 1Male, INDIA, Kerala, Wyanad, 10-ii-1996, Reeja Samuel, (DZCU) .1Male, Kerala, Manjeri 18-iii-1999, Fousi.K. (DZCU). Cali. Uni. Campus, 23-v-2000, M.Koya (DZCU). Cali. Uni. Campus, 18-x-1996, Leena. P.T. (DZCU).

Biology: Unknown.

Habitat: Undisturbed grass lands.

Distribution: India : Kerala, Tamil Nadu, Madhya Pradesh, Uttar Pradesh, West Bengal, Sri Lanka.

Discussion: This species *Schizocephla bicornis* (Linnaeus) is a monotypic species of Subfamily Schizocephalinae.

Subfamily Thespinae

Diagnostic characters:

Body delicate, medium sized, dirty yellowish brown, frontal sclerite narrow. Mesosoma slender, a little longer than fore coxa, prozona spatulate, metazona carinated; forelegs simple, slender; forefemur with 4 external and 4 discoidal spines; middle and hind legs long and slender; both wings shorter than metasoma.

Two tribes occur in India.

Key to Tribes

- Eyes globular..... Thespini
 - Eyes obtusely conical dorsally..... Parathespini

Tribe Parathespini

Diagnostic characters:

Eyes dorsally conical; forewing short; forecoxa with divergent internal apical lobes; forefemur with 4 external and 4 discoidal (third the longest) spines; claw grooves at distal one third of forefemur; supra anal plate long and lanceolate; cerci slender.

Genus *Parathespis* Saussure

Parathespis Saussure 1869. *Mitt. Schweiz. Entomol. Ges.* 3:58

Type species *Parathespis humbertiana* Saussure

Diagnostic characters:

Body delicate; eyes conical dorsally, globular ventrally; frontal sclerite transverse, narrow, truncate superiorly. Mesosoma a little longer than forecoxa, slender, prozona spatulate, metazona carinated ; forelegs slender, forecoxa with divergent internal apical lobes; forefemur with 4 external and 4 discoidal spines (third spine 3x longer than second); claw groove distally placed; foretibia compressed with 5 external spines; middle and hind legs much longer and slender, supra anal plate lance shaped.

Distribution: India, Tropical Oriental Regions.

***Parathespis humbertiana* Saussure**

(Figs.227-232)

Parathespis humbertiana Saussure 1869. *Mitt.Schweiz.Entomol.Ges.*3:71

Holotype. Sri Lanka.

Plesiotype: Male body length 32 mm.

Colour: Straw yellow. Vertex straw yellow with fuscous tinge, anteriorly with black spots; eyes fuscous with wood brown circles; ocelli ferrugeneous; frontal sclerite, clypeus and labrum concolorous with vertex ; antenna: scape and pedicel dirty straw yellow, fuscous towards apex. Mesosoma straw yellow with testaceous tinge, denticles along lateral sides cream; mesosternum straw yellow with fuscous streaks and spots; forelegs, middle and hind legs ventrally straw yellow, dorsally testaceous, all spines of forefemur and foretibia black at apex only; wings straw yellow. Metasoma fuscous.

Head: 1.8x wider than high, vertex concave in front, middorsally slightly elevated, lateral lobes slanting; occiput with pointed tip; eyes laterally globular; anteriorly conical; ocelli globular, conspicuous, large, all three of same size; POL:OD:OOL = 2:4:3; frontal sclerite transverse, 4x wider than high, superior margin straight at middle, laterally concave; disc not smooth, depressed, inferiorly sinuate;

antenna slender, with minute setae, flagellar segments elongated, tapering towards apex.

Mesosoma: elongated, slender, prismatic with raised carina midlongitudinally, sides denticulated; nearly 2x longer than forecoxa; prozona spatulate and carinate medially; metazona 2.7x longer than prozona; mesosternal disc flat. Forelegs: elongated, slender and simple, coxa with dorsal ridge inferiorly denticulated; ventrally flat; internal apical lobes divergent; femur 1.4x longer than coxa and 4.6x longer than tibia, spines placed at distal one third portion, with 4 external, 3 discoidal (third longest), 6 longer internal and 6 shorter internal spines; tibia with five external and seven internal spines; metatarsus 1.8x longer than all other tarsal segments together; middle and hindlegs slender, elongated and simple; coxa short; middle tibia shorter than midfemur; hindfemur shorter than tibia; metatarsus more than 2x longer than all other tarsal segments together; forewings shorter than hindwings; subopaque, costal area opaque with dense broad reticulated venation; anal segment opaque with fine reticulation; costal vein bifurcates at middle; anterior radial vein bifurcates at middle, post radial bifurcates proximally; hindwing semihyaline, all veins run parallel.

Metasoma: shorter than wings; slender, elongated and carinated middorsally; supra anal plate broad; cerci short.

Biology: Unknown

Distribution: India, (Andhra Pradesh, Karnataka, Madhya Pradesh, Tamil Nadu), Srilanka.

Materials examined: Plesiotype, 1 male, INDIA, Tamil Nadu, Annamali, 11-viii-2000, R.Kanakarajan (DZCU).

Discussion: Only one species *P. humberiana* is reported from tribe Parathespini by Giglio Tos 1927 and Mukherjee 1985. This has close affinity with tribe Thespini of subfamily Thespiinae except that eyes are produced in front in the form of obtuse cone (eyes round in Thespini)

Subfamily Toxoderinae

Diagnostic characters:

Body usually brown, long and bizarre shaped; head small; eyes conical or oval with or without spine. Mesosoma longer than forecoxa; metazona carinated. Forefemur with 4-6 external, 3-4 discoidal spines; claw groove palced proximally; foretibial spines distributed towards distal end. Middle and hind legs with lobes. Supra anal plate transverse; cerci flat.

One tribe is known from India.

Tribe Toxoderini

Fore tibial spines at distal end only

Seven genera are known from India.

Key to Genera

- 1 Fore femur with 4 external spines.....*Cheddikulama* Henry
 - Fore femur with 5-6 external spines.....2
- 2 Mid and hind tibia dorsally carinate.....*Aethalochroa* Wood-Mason
 - Mid and hind tibia not dorsally carinate.....3
- 3 Vertex with protuberance.....4
 - Vertex without protuberance.....5
- 4 Middle lobe of vertex elevated more than lateral lobes.....
*Toxoderopsis* Wood-Mason
 - Middle lobe of vertex not elevated more than lateral lobes.....
*Paradanuria* Wood-Mason
- 5 Metasomal terga produced posteriorly into a delicate filamentous process
*Euthyphleps* Wood-Mason
 - Metasomal terga not produced into filamentous process.....6
- 6 Metazona as long as prozona.....*Toxomantis* Giglio-Tos

- Metazona much longer than prozona..... *Loxomantis* Giglio-Tos

Genus *Aethalochroa* Wood-Mason

Arsacia Stal 1877. *Bih. K. Svenska. Vetensk Akad. Handl.* 4 (10) : 70.

Type species *Arsacia ashmoliana* (Westwood) Pre occupied.

Aethalochroa Wood-Mason 1877 *Ann. Nat. Hist. London* (4) 19 : 308.

Type species *Aethalochroa ashmoliana* (Westwood)

Diagnostic characters:

Body large, bizzare shaped, dark fuscous, Head small, vertex with mid lobe slightly elevated antero posteriorly, summit of vertex carinated and concave; eyes large, globular, sometimes terminates in a spine; antenna short and slender, non ciliated; frontal sclerite pentagonal at right angle to clypeus. Mesosoma, longer than forecoxa, robust, distinctly carinated midlongitudinally, highly tuberculated; forecoxa a little dialated; forefemur slender with 5 external, 3 discoidal spines, claw groove at base; foretibia slender, with spines at distal end; mid and hindlegs short, femur and tibia lobed and carinated with genicular spines; metatarsus and other tarsal segments short; wings grey brown to fuscous, forewings with proximal and distal dark patches; hindwings semihyaline with concentrically arranged dark patches. Metasoma linear, slightly flattened, segments with ventral carina, last 3 segments exposed since wings are short; supra anal plate short, twice as broad as long; cerci flat and foliaceous.

Distribution: India, Kerala, Orissa, North India.

***Aethalochroa ashmoliana* (Westwood)**

(Fig 233-238) (Plate X Fig.1)

Vates ashmoliana Westwood 1841 *Ann. Nat. Hist.* 8 : 272 Syntypes M F

India Murshidabad and Culcutta.

Popa ashmoliana Saussure 1871 *Mem. Soc. Phys. Hist. Nat. Geneva*, 21: 161.

Arsacia ashmoliana Wood Mason 1877 *Bih. K. Svenska Vetensk Akad.*

Handl. 4(10):75.

Aethalochroa ashmoliana Wood Mason 1877 *Ann. Nat. His.* 19(4) : 308.

Plesiotype: Male body length 110 mm.

Colour: Colour of dried leaves. Head testaceous with fuscous to black spots; eyes testaceous with black patches; antenna testaceous; ocelli fuscous; frontal sclerite disc black, border testaceous; clypeus, labrum and gena testaceous, gena with a black patch. Mesosoma clay brown with black patch at lateral border of supra coxal dialation, disc with black tubercles dorsally and ventrally; forecoxa concolorous with mesosoma, femur and tibia greyish brown with fuscous to black patch at proximal and distal ends, all spines of forefemur and foretibia black at apex only; both in middle

and hind legs coxa and femur greyish brown, tibia and femoral lobes fuscous; forewing semihyaline, posterior side greyish brown with fuscous patches, anterior portion fuscous; hindwings hyaline with concentric fuscous patches. Metasoma and cerci fuscous.

Head: small, more or less globular, 1.1x wider than long; vertex not smooth; middle lobe angular, raised at middle summit; occiput obtusely angular at base; eyes globular, not projecting much; antenna simple, slender, filiform, not setaceous; ocelli large, conspicuous, closely placed; POL: OD: OOL= 7 :10:10; frontal sclerite rhomboidal; superior border arched at middle, laterally concave; disc depressed; inferiorly arched; 1.3x wider than high; clypeus placed at right angle to disc of frontal sclerite.

Mesosoma: elongated, robust, denticulated laterally, dorsally and ventrally; prozona spatulate; distinctly carinated mid longitudinally, supra coxal dialation well pronounced; mesosoma 7.6x longer than wide at supra coxal dialation; metazona 3.75x longer than prozona; mesosternum flat. Forelegs: simple, slender, coxa triangular in cross section; ridged middorsally, tuberculated inferiorly; internal apical lobes divergent; femur slender; slightly longer than coxa with 5 external, 3 discoidal, 8 longer internal and 5 shorter internal spines; a wide gap between two internal longer distal spines; claw groove at base, with a pit in between first and second external spines; tibia slender, as long as coxa, spines born distally, tibia with 9 internal (gradually elongated towards the apex) and 5 external spines (placed towards distal

end); metatarsus equal in size with all tarsal segments together. Middle and hind legs short and stout; coxa short; femur slightly foliaceous with internal and external distal lobes; femur triangular in cross section, stouter than tibia; tibia foliaceous, with lamellar carinae and two terminal spines; metatarsus short; other tarsal segments a little longer than metatarsi; forewings semihyaline; costal area more opaque; reticulately venated; anterior radial vein trifurcates proximally; hind wing longer than forewing (both wings shorter, upto three fourth of metasoma).

Metasoma: elongated; supra anal plate triangular, cerci foliaceous.

Materials examined: Plesiotype, male, INDIA, Kerala, Cali.Uni.Campus, 4-vi-1994, Pramila (DZCU). Other material examined :1female, INDIA, Kerala, Meenangadi (Wynad), 18-v-99, Vyjayandi(DZCU). 1 female, INDIA, Kerala, Cali.Uni.Campus, 24-vii-93, Biji M, (DZCU). Female: slightly longer than male; with stouter body; metasoma flatter, with semiopaque forewing; hindwing purple checks alternates with transparent, hyaline blocks; costal area deep purple, posterior tip of both wings deep purple.

Biology: Unknown,

Habitat: Seen at the interior undisturbed forest area .

Distribution: India, Maharashtra, Orissa, West Bengal

Discussion: *Aethalochroa ashmoliana* (Westwood) is closely related to *Aethalochroa insignis* Wood-Mason in the following characters: 1. Frontal sclerite

pentagonal. 2. Eyes smooth. 3. Forefemur slender. 4. Hindfemur with lobes. *Aethalochroa ashmoliana* West wood is different from *Aethalochroa insignis* Wood-Mason in the following characters: 1. Body size comparatively smaller in *A. ashmoliana* (body comparatively larger in *A. insignis*) 2. The lobes on the mid and hind femora are regular and smaller in *A. ashmoliana* (the lobes of mid and hind femora larger and irregular in *A. insignis*).

Genus *Cheddikulama* Henry

Cheddikulama Henry 1932. *Spolia Zeylanica*. vol. 17 (1): 13

Type species *Cheddikulama straminea* Henry.

Diagnostic characters:

Body long and slender, in general appearance resembles a piece of straw. Head large, broader than long, pentagonal, flattened; occiput produced into two angular lobes; frontal sclerite transverse, superior end bluntly conical; eyes laterally conical, bearing a small bifid tubercle at their lateral extremity. Mesosoma slender, twice longer than fore coxa; supra coxal dialation very little pronounced; metazona medianly carinated; forecoxa slightly expanded, internal apical lobes divergent; forefemora slender with 4 external and 4 discoidal spines; internal spines one longer alternating with one shorter spine proximally, distalmost two longer internal spines enclose 4-5 smaller spines; midfemora carinated and two ventral carinae produced

distally into a pair of slender, compressed, spine like genicular lobes; hindlegs much longer than middle legs; wings ornate; forewing with parallel venation; hindwing with purple blotch and concentrically arranged purple patches.

Metasoma: slender; cerci compressed, almost foliaceous.

Distribution: India, Sri Lanka.

***Cheddikulama straminea* Henry**

(Figs 239-245) (Plate X Fig. 2)

Cheddikulama straminea Henry 1932. *Spolia Zeylanica* 17(1): 13

Plesiotype: Male body length: 60 mm

Colour: Straw yellow, appears like a piece of dry straw. Vertex straw yellow with a few black granules; eyes testaceous with fuscous patches; ocelli ferrugeneous; antenna, clypeus and labrum straw yellow; frontal sclerite testaceous with two black tubercles at superior margin. Mesosoma dorsally straw yellow, testaceous at posterior tip; mesosternum with black granules; legs, legs concolorous with mesosoma; all spines of forefemur black at tips only; forewings straw yellow; stigma testaceous, hindwings hyaline except along costal area, rose pink at base of anal area with large oval fuscous blotch illuminated with blue and violet reflexions on discoidal area; outer to blotches with broken concentric bands of same colour extending nearly to margin;

between these areas rows of semi opaque lemon yellow spots. Metasoma straw yellow with testaceous tinge.

Head: large, flattened, 1.3x wider than high, broadly pentagonal; occiput produced into two angular lobes with a round knobe between them, posterior margin of occiput concave; vertex flat, middle lobe slightly pronounced; ocelli large, face short. POL: OD : OOL = 5: 3: 7; eyes produced laterally, mammiform, each with a small, slightly bifid tubercles at lateral extremity; frontal sclerite transverse, 2.5x wider than high; slightly arched upward and below, not carinate; clypeus somewhat globular.

Mesosoma: long, slender, 2x longer than forecoxa, supra coxal dialation very little pronounced, prozona spatulate, somewhat depressed, metazona semicylindrical, 3x longer than prozona; granulated. Forelegs: elongated, angular, forecoxa slender, slightly expanded on the outer margin distally, proximal surface convex, outer carina well developed, with minute serrations, internal apical lobes angular and divergent; forefemur slender, dorsal margin nearly straight, distally produced into a slightly up-turned, bluntly pointed lobe, with 4 external, 4 discoidal (first spine placed at right angles to other three, latter placed in a straight line; third twice longer than others), forefemur internally with 5 longer and 8 shorter spines, a row of small tubercles present at base, immediately distal to fourth discoidal spine a round pit present for reception of distal external tibial spine; claw groove middle; foretibia compressed with 11 small external and 15 internal spines; metatarsus as long as all other tarsal segments together; middle leg shorter than hind leg, mid and hind

coxa short; midfemur as long as midtibia, rectangular in section, outer and inner longitudinal carina outwardly and distally forms into somewhat compressed, long, pointed genicular lobes ; hindfemur less carinated, with less conspicuous genicular lobes than midfemur; metatarsus shorter than all other tarsal segments together. Wings: shorter than metasoma, subopaque, forewing narrow, with somewhat dilated costal area, tip sharply round; venation almost parallel, anterior radial and posterior radial veins bifurcate proximally and runs parallel, ulnare vein triramose; anal membrane narrow; hindwing shorter than forewing, costal area with transverse cross veins.

Metasoma: narrow, slightly expanded at seventh segment, ninth segment with its convergent sides terminating distally with angular points, supra anal plate transverse, concavely truncated medially; cerci short, more or less oval, strongly compressed at base.

Materials examined: Plesiotype: INDIA, Kerala, Cali. Uni. Campus, 11-IX-1997, T C Narendran (DZCU). Other materials examined: INDIA, Kerala, Parambikulam Wild life Sanctuary, Anjupoola, 31-X-1995(final instar stage with both wing buds) , P. M Sureshan,(ZSI Calicut)Reg. No. 8357.

Biology: Unknown.

Habitat: Undisturbed areas.

Distribution: India, Kerala, Uttar Pradesh.

Discussion: This genus erected by G M Henry is a monotypic one and according to Uvarov to whom the description and figures were submitted by Henry states " this genus appears to belong to the Vatinae in spite of the poorly developed carina on the hind tibia and that it probably belongs to a group by itself near Aethalochroa. It seems possible, however that it may be more nearly related to the group Austrovates from North West Australia. The form of the cerci separate it from the Danuriae of Africa with which it seems to show considerable affinity in other respect".

Genus *Toxoderopsis* Wood-Mason

Toxoderopsis Wood-Mason 1889. *J. Asiatic. Soc. Bengal.* 58 : 317

Type species *Toxoderopsis spinigera* Wood-Mason

Diagnostic characters:

Body brown; bizzare shaped. Head small, wider than high; median lobe of vertex higher than laterals; frontal sclerite narrow, truncate superiorly with a median prominent semicircular area and lateral quadrate area; eyes with lateral spine; ocelli large. Mesosoma spiny or tuberculated; prozona spatulate, supra coxal dialation well pronounced; metazona carinated, as long as forecoxa forecoxa with inner distal serrated lobe; forefemur slender with five external and three discoidal spines, claw groove proximally placed; middle and hind legs short, mid and hind femora with

genicular spines and with two small dorsal and one ventral foliaceous lobes; mid and hindtibia simple; wings shorter than metasoma. Metasoma a little flat, supra anal segment short, cerci foliaceous.

Distribution: India, (Kerala, Maharashtra, Orissa).

Two species occur in India.

Key to Indian species of *Toxoderopsis* Wood-Mason

- Frontal process above the ocelli spiniform..... *T. spinigera* Wood-Mason
 - Frontal process above the ocelli bifid in female, truncate in male
 *T. taurus* Wood-Mason

***Toxoderopsis spinigera* Wood-Mason**

(Figs246-251) (Plate X Fig.3)

Toxoderopsis spinigera Wood-Mason 1889 *J. Asiat. Soc. Bengal.* 58:

319. Holotype. F. India, Bombay ZSI.

Plesiotype: Male Body length 88 mm.

Colour: Of dried, decaying leaves. Head fuscous; eyes black; frontal sclerite, clypeus, labrum and mesosoma concolorous with head; antenna proximally testaceous, distally fuscous; forecoxa and forefemur proximally testaceous, distally fuscous; foretibia clay brown with dorsal black line; middle and hind legs fuscous; forewing costal area fuscous, rest fummy brown; veins with fummy brown and dark brown streaks; base of anterior radial and anal area smeared with dark fuscous spots; hindwing hyaline, fummy brown with light fuscous veins. Metasoma dark brown.

Head: as wide as high, vertex centrally with a triangular elevation, anteriorly with a trapezoidal area marked out by ridge, possesses a sharp frontal spinuous process; anteriorly between eye and antenna a spine like tubercle present; antenna filiform, slender with minute dispersed setae; eyes laterally oval, produced slightly above the level of lateral lobes of vertex with upper and outer angles bearing a very sharp incurved conical, corneal spine; ocelli large, placed raised from the surface; POL: OD: OOL = 10: 7: 7; frontal sclerite 4x wider than high; divided into three parts, median prominent semicircular lobe with sinuate superior border and two lateral subquadrate areas, leaving a very narrow space intervening them and eye; clypeus placed at right angles to frontal sclerite.

Mesosoma: elongated, tuberculated all over surface, with distinct denticulated metazonal mid dorsal carina, supra coxal dialation well pronounced, mesosoma 6.4x longer than wide at supra coxal dialation, prozona spatulate with weak median furrow, metazona steeply roofed with strong midlongitudinal, roughly denticulated carina, 3.5x

longer than prozona; mesosternum mid ventrally carinated. Forelegs long and slender, coxa with anterior crest upto two-fifths of its length, distally with a inner conspicuous, expanded, dentate, foliaceous lobe, internal apical lobes divergent; trochanter small, tuberculated; femur narrow, slender, superior margin nearly straight, carinated, carina ending in a sharp genicular lobe, somewhat longer than the lateral lobes, femur 1.2x longer than coxa, with 5 external (in between first and second spine a pit present), 3 discoidal, 5 longer internal, 5 shorter internal spines, distally in between 2 longer spines a wide gap present; tibia slender, straight, as long as forecoxa, with 9 internal and 4 external spines, all spines placed distally, metatarsus short, as long as all tarsal segments together. Middle and hind legs short and weak, coxa simple, femur prismatic, slightly tapering both ends with 4 strong crests and strong ridge on each side, with 3 genicular lobes, ventral crests expanded into a foliaceous lobe divided into two obliquely pointed lobules, tibia simple, slender, longer than femur, metatarsus shorter than other two tarsal segments together. Wings: both shorter than metasoma, semihyaline, forewing with costal area opaque, with reticulate venation, costal veins bifurcate peripherally, anterior radial and post radial veins originate from the main stem and post radial and ulnare vein bifurcates.

Metasoma: smooth and polished without foliaceous lobes, sub parallel sided, bluntly carinated dorsally, last segment with serrated ends; cerci foliaceous, acutely bifid.

Materials examined: Plesiotype: Male, INDIA, Kerala, Cali. Uni. Campus, 10-ix-1999, T.C Narendran(DZCU). Other materials examined: 1 male, INDIA, Kerala, Cali. Uni. Campus, 13-xi-99, T C Narendran(DZCU), 1 female, INDIA, Kerala, Cali. Uni. Campus, 10-ix-99, Suharabi (DZCU), 1 female, INDIA, Kerala, Cali. Uni. Campus, 10-ix-99, C F Hussain (DZCU).

Biology: Unknown.

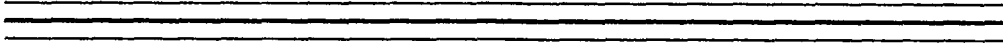
Habitat: Undisturbed areas.

Variation: Some specimens are found to have eyes creamy white with contrast fuscous spines, whereas in the plesiotype, eyes concolorous with spines.

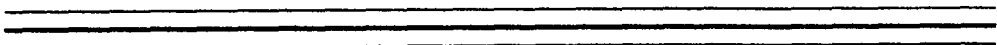
Distribution: India, Kerala, Maharashtra

Discussion: This species *Toxoderopsis spinigera* Wood-Mason is closely related to *Toxoderopsis taurus* Wood-Mason in the following characters: 1. Vertex seen below the level of eyes. 2. Eyes with ocular spine. 3. Mesosoma distally carinated, tuberculated. 4. Posterior margin of metasomal segments briefly lobulated. This species *Toxoderopsis spinigera* is different from *T. taurus* in the following characters: 1. Frontal process spiniform in *T. spinigera* (frontal process bifid in female, truncate in male in *T. taurus*). 2. Body comparatively large in *T. spinigera* (smaller in *T. taurus*)

0208



Check List



CHECK LIST

Mantodea (=Mantoidea or Manteodea) of India

FAMILY AMORPHOSCELIDAE Stal

1. Genus *Amorphoscelis* Stal

- | | |
|--|--|
| <i>A. annulicornis</i> Stal, 1871 | India, Assam, Bihar, Daman & Diu,
Himachal Pradesh, Kerala,
Meghalaya, Tamil Nadu, West Bengal,
(Sri Lanka) |
| <i>A. brunneipennis</i> Beier, 1956 | India, Kerala. (Sri Lanka) |
| <i>A. singaporana</i> Giglio-Tos, 1915 | India, Assam, (Singapore, Sumatra,
Thailand) |

FAMILY EMPUSIDAE Burmeister

Subfamily Empusinae Saussure

2. Genus *Empusa* Illiger

- | | |
|------------------------------------|--|
| <i>E. fasciata</i> Brulle, 1832 | India, Bihar (Philippiens, Balacan) |
| <i>E. guttata</i> (Thunberg), 1815 | India, Andhra Pradesh, Orissa, Rajasthan,
Uttar Pradesh, (Africa) |

E. pauperata (Fabricius), 1781 India, Eastern Coast, (Myanmar, Sri Lanka)

E. spinosa Krauss, 1902 India, Chandigarh (Saudi Arabia)

3. Genus *Gongylus* Thunberg

G. gongyloides (Linnaeus), 1758 India, Andhra Pradesh, Kerala, Tamil Nadu,
West Bengal (Indonesia, Java, Sri Lanka)

G. trachelophyllus Burmeister, 1838 India, Bihar, Orissa

Subfamily Blepharodinae Beier

4. Genus *Blepharopsis* Rehn

B. mendica (Fabricius), 1775 India, Rajasthan, Uttar Pradesh, (Africa,
Canary Island)

FAMILY EREMIAPHILIDAE Wood-Mason

5. Genus *Eremiaphila* Lefebvre

E. rotundipennis Kirby, 1871 India, Gujarat, (Egypt)

FAMILY HYMENOPODIDAE Chopard

Subfamily Acromantinae Giglio – Tos

Tribe Acromantini

6. Genus *Acromantis* Saussure

- A. insularis* Giglio -Tos, 1915 India, Kerala, Tamil Nadu, Karnataka,
(Indonesia, Java, Sumatra)
- A. montana* Giglio -Tos, 1915 India, Arunachal Pradesh, Kerala,
Meghalaya, Tripura (Indonesia, Java)
- A. nicobarica* Mukherjee, 1966 India, Nicobar Island
- A. oligoneura* (De Hann), 1842 India, Assam, Meghalaya (Bangladesh,
Indonesia, Sunda Island)
7. Genus *Ambivia* Stal
- A. popa* Stal, 1877 India, Kerala, Sikkim, West Bengal
(Indonesia, Kalimantan, Sumatra, Myanmar,
Sri Lanka)
8. Genus *Anaxarcha* Stal
- A. acuta* Beier, 1963 India, Meghalaya, Sikkim, West Bengal
- A. graminea* Stal, 1877 India, Kerala, Sikkim, West Bengal,
- A. intermedia* Mukherjee, 1983 India, Arunachal Pradesh, Meghalaya
- A. limbata* Giglio -Tos, 1915 India, Kerala, (Indonesia, Kalimantan,
Borneo)
9. Genus *Ephestiasula* Giglio -Tos
- E. amoena* (Bolivar), 1897 India, Kerala, Tamil Nadu, West Bengal
- E. intermedia* Werner, 1930 India, Jammu & Kashmir, Karnataka,
Madhya Pradesh, Rajasthan,
Uttar Pradesh, Orissa

- E. pictipes* (Wood-Mason), 1897 India, Madhya Pradesh, Orissa,
Uttar Pradesh
10. Genus *Euantissa* Giglio -Tos
- E. ornata* Werner, 1935 India,(Bangladesh)
- E. pulchra* (Fabricius), 1787 India, Estern & North Eastern India,
Kerala (Sri Lanka)
11. Genus *Heliomantis* Giglio-Tos
- H. elegans* (Navas), 1904 India, Assam, West Bengal
12. Genus *Hestiasula* Saussure
- H. brunneriana* Saussure, 1871 India, Andra Pradesh, Meghalaya,
West Bengal, (Bengladesh, Sri Lanka)
- H. castetsi* (Boliver), 1897 India, Tamil Nadu
- H. inermis* (Wood-Mason), 1897 India, Assam, Sikkim, West Bengal
- H. kastneri* Beier, 1941 India, Tamil Nadu
- H. masoni* Giglio-Tos, 1915 India
- H. nigrofemorata* Werner, 1930 India, Uttar Pradesh
- H. woodi* Giglio-Tos, 1915 India
13. Genus *Nemotha* Wood-Mason
- N. metallica* (Westwood), 1843 India, Arunachal Pradesh, Assam,
(Bangladesh)

14. Genus *Odontomantis* Saussure*O. micans* (Saussure), 1871India, (Indonesia, Kalimantan,
Sumatra, Sri Lanka)*O. montana* Giglio-Tos, 1915

India, Orissa (Indonesia, Sumatra)

15. Genus *Creobroter* Audinet-Serville*C. apicalis* Saussure, 1869India, Assam, Karnataka, Kerala,
Manipur, Meghalaya, Orissa, Sikkim,
West Bengal.*C. elongata* Beier, 1929

India, Sikkim

C. gemmatus (Stoll), 1813India, Arunachal Pradesh, Himachal-
Pradesh, Sikkim, Uttar Pradesh(Myanmar,
China, Indonesia, Java)*C. laevicollis* (Saussure), 1870India, Andhra Pradesh, Assam, Meghalaya
Sikkim, West Bengal,(Indonesia, Java)*C. urbanus* (Fabricius), 1775

India, Meghalaya, (Indonesia, Java)

16. Genus *Hymenopus* Audinet-Serville*H. coronatus* (Oliver), 1792India, Assam, (Indonesia, Kalimantan,
Sunda Islands)

FAMILY MANTIDAE Burmeister

Subfamily Amelinae Giglio-Tos

Tribe Amelini

17. Genus *Amantis* Giglio-Tos

- | | |
|-------------------------------------|--|
| <i>A. biroi</i> Giglio-Tos, 1915 | India, Andhra Pradesh, West
Bengal |
| <i>A. indica</i> Giglio-Tos, 1915 | India, Sikkim |
| <i>A. malabaransis</i> sp. nov. | India, Kerala |
| <i>A. saussurei</i> (Bolivar), 1897 | India, Andhra Pradesh, Kerala,
Tamil Nadu |
| <i>A. subirina</i> Giglio-Tos, 1915 | India, Assam, West Bengal |

18. Genus *Cimantis* Giglio-Tos

- | | |
|-----------------------------------|---|
| <i>C. fuliginosa</i> Werner, 1931 | India, Tamil Nadu |
| <i>C. fumosa</i> Giglio-Tos, 1915 | India, Arunachal Pradesh, Kerala,
Uttar Pradesh, West Bengal |
| <i>C. tetacea</i> Werner, 1931 | India, West Bengal |

19. Genus *Elmantis* Giglio-Tos

- | | |
|---|---|
| <i>E. trincomaliae</i> (Saussure), 1869 | India, Andhra Pradesh, Karnataka, Kerala,
Maharashtra, Tamil Nadu, (Sri Lanka) |
| <i>E. nira</i> Mukherjee & Hazra, 1983 | India, Maharashtra |

	Tamil Nadu, West Bengal
<i>L. lactea</i> (Saussure), 1870	India, Meghalaya, (Indonesia, Java, Kalimantan, Philippines)
<i>L. montana</i> Beier, 1941	India, Assam, Meghalaya, West Bengal
<i>L. nigrocoxata</i> Mukherjee, 1995	India, Arunachal Pradesh
<i>L. parva</i> Werner, 1933	India, Kerala, Uttar Pradesh

Subfamily Choeradodinae Kirby

27. Genus *Choeradodis* Audinet-Serville

<i>C. cancellata</i> (Fabricius), 1775	India, Meghalaya, South India, (Sri Lanka)
<i>C. squilla</i> Saussure, 1869	India, MIndia, Meghalaya, (Sri Lanka)

Subfamily Deroplatinae Giglio-Tos

28. Genus *Parablepharis* Saussure

<i>P. kuhlil</i> (De Hann), 1842	India, Arunachal Pradesh, Assam, (Indonesia, Java, Kalimantan)
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Subfamily Iridopteryginae Giglio-Tos

Tribe Iridopterygini

29. Genus *Hapalopeza* Stal

H. nilgrica Wood-Mason, 1891 India, Tamil Nadu

H. periyara Mukherjee&Hazra, 1985 India, Kerala

H. trissurensis sp.nov. India, Kerala

30. Genus *Nanomantis* Saussure

N. lactea Mukherjee, 1995 India, Tamil Nadu

31. Genus *Parananomantis* Mukherjee

P. brevis Mukherjee, 1995 India, Assam, Himachal Pradesh,
Jammu, Kamataka, Manipur,
West Bengal.

Tribe Tropidomantini

32. Genus *Eomantis* Giglio-Tos

E. guttatipennis (Stal), 1877 India, Assam, Bihar, Gujarat,
Karnataka, Tamil Nadu,
West Bengal, (Tibet)

E. iridipennis (Westwood), 1889 India, Kerala, (Indonesia, Java,
Sri Lanka)

33. Genus *Ormomantis* Giglio-Tos

O. indica Giglio-Tos, 1919 India

Subfamily Litrugusinae Giglio-Tos

34. Genus *Humbertiella* Saussure

- H. affinis* Giglio-Tos, 1917 India, Karnataka, Kerala, Orissa,
(Sri Lanka)
- H. ceylonica* Saussure, 1869 India, Assam, Bihar, Kerala,
- H. indica* Saussure, 1869 India, Gujarat, Karnataka, Madhya
Pradesh, Maharashtra, Tamilnadu,
Uttar Pradesh, (Sri Lanka)
- H. nigrospinosa* Sjostedt, 1930 India, Orissa, Uttar Pradesh
- H. similis* Giglio-Tos, 1917 India, Himachal Pradesh, Jammu, Kerala,
Madhya Pradesh, Orissa, Uttar Pradesh,
(Nepal, Sri Lanka)

35. Genus *Theopompa* Stal

- T. ophthalmica* (Oliver) , 1792 India, Eastern & Southern India,
(Indonesia, Ambon, Seram, Java)
- T. serville* (De Hann) , 1842 India(?), (Indonesia, Java, Seram,
Thailand, Mergui)

Subfamily Mantinae Burmeister

Tribe Mantini

36. Genus *Hierodula* Burmeister

Subgenus *Hierodula* (*Hierodula*) Giglio-Tos

<i>H. (H) assamensis</i> Mukherjee, 1995	India, Arunachal Pradesh, Assam, Meghalaya
<i>H. (H) beieri</i> Mukherjee, 1995	India, Arunachal Pradesh
<i>H. (H) bipapilla</i> (Audinet-Serville), 1839	India, Bihar, Himachal Pradesh, Uttar Pradesh, West Bengal, Kerala, (Indonesia, Java, China, Taiwan, Japan)
<i>H. (H) doveri</i> Chopard, 1924	India, Karnataka, Kerala, Orissa, Tamil Nadu
<i>H. (H) grandis</i> Saussure, 1870	India, Assam, (Bangladesh)
<i>H. (H) malabarensis</i> sp. nov	India, Kerala
<i>H. (H) membranacea</i> (Burmeister), 1838	India, Kerala, Orissa, Tamil Nadu (Indonesia, Java, China)
<i>H. (H) nicobarica</i> Mukherjee, 1995	India, Nicobar Islands
<i>H. (H) saussurei</i> Kirby, 1904	India, Arunachal Pradesh, Kerala, (Bhutan, China, Indonesia, Java)
<i>H. (H) tenuidentata</i> Saussure, 1869	India, Andamans, Bihar, Kerala, Lakshadweep, Kerala, Madhya Pradesh, Orissa, Uttar Pradesh,

- West Bengal, (Indonesia,
Kalimantan, West Asia)
- H. (H) unimaculata* (Oliver), 1792 India, Karnataka, West Bengal
(China, Java, Sri Lanka)
- H. (H) ventralis* Giglio-Tos, 1912 India, Kerala, Chandigarh, Madhya
Pradesh, Maharashtra

Subgenus *Hierodula (Rhombodera)* Giglio-Tos

- H. (R) butleri* Wood-Mason, 1878 India, Assam, Meghalaya, Sikkim,
West Bengal
- H. (R) crassa* Giglio-Tos, 1912 India, Madhya Pradesh, Meghalaya
- H. (R) doriana* Laidlaw, 1931 India, Bihar
- H. (R) fracticida* Wood-Mason, 1878 India, Kerala, (Indonesia,
Kalimantan, Sumatra)
- H. (R) tectiformis* Saussure, 1870 India, Bihar, Sikkim, Tamil Nadu,
West Bengal
- H. (R) woodmasoni* Werner, 1931 India, Tamil Nadu, Uttar Pradesh,
(Malaysia)

37. Genus *Mantis* Linnaeus

- M. indica* Mukherjee, 1995 India, Himachal Pradesh
- M. inomata* Werner, 1930 India, Uttar Pradesh
- M. nobilis* Brunner, 1892 India, Himachal Pradesh, Manipur,
West Bengal, (Myanmar)

West Bengal, (Eastern Asia)
S. nemoralis (Saussure) ,1870 India, Arunachal Pradesh, Kerala,
 Tamil Nadu, West Bengal, (Eastern
 Asia, Philippines)

43. Genus *Tenodera* Burmeister

T. angustipennis Saussure, 1869 India, Meghalaya, Sikkim, (China,
 Japan, Korea)

T. aridifolia (Stoll) ,1813 India, Arunachal Pradesh,
 Assam, Himachal Pradesh, Sikkim,
 Uttar Pradesh, West Bengal, (China,
 Taiwan, Indonesia, Philippines)

T. blanchardi Giglio-Tos ,1912 India, Kerala, (Indonesia, Ambon,
 Kalimantan, Seram, Bismark,
 Archipelago, New Guinea)

T. bokiana (Giglio-Tos) ,1907 India, Kerala, (Congo, Uganda,
 N. Australia)

T. fasciata (Oliver) ,1792 India, Assam, Manipur, Meghalaya,
 West Bengal, (China, Surinam)

T. superstiosa (Fabricius) ,1781 India, Andamans, Bihar, Kerala,
 Punjab, Uttar Pradesh, (Africa)

Tribe Miomantini

44. Genus *Arria* Stal

A. cinctipes Stal, 1877 India, Eastern India, Manipur

45. Genus *Deiphobe* Stal

D. brevipennis Sjostedt, 1930 India, Himachal Pradesh

D. brunneri (Saussure) , 1871 India, Himachal Pradesh, Manipur,
Uttar Pradesh

D. incisa Werner, 1933 India, Madhya Pradesh, Maharashtra,
Punjab, Rajasthan

D. indica Giglio-Tos ,1916 India, Himachal Pradesh, Madhya
Pradesh

D. infusate (Saussure) , 1871 India, Bihar, Himachal Pradesh, Jammu &
Kashmir, Madhya Pradesh, Tamil Nadu,
Uttar Pradesh

D. longipes Werner, 1926 India

D. mesomelas (Olivier), 1792 India, Himachal Pradesh, Maharashtra

46. Genus *Deiphobella* Giglio-Tos

D. gardeneri Werner , 1935 India, Uttar Pradesh

D. laticeps (Wood-Mason) , 1876 India, Karnataka, Kerala, (Sri Lanka)

47. Genus *Indothespis* Werner

I. assamensis Werner, 1935 India, Assam

48. Genus *Iris* Saussure

- | | |
|--|--|
| <i>I. nana</i> Uvarov , 1930 | India, Punjab, Rajasthan,
(Afghanistan, Iran, Iraq) |
| <i>I. orientalis</i> Wood-Mason , 1882 | India, Himachal Pradesh, Rajasthan |
| <i>I. keralensis</i> sp.nov. | India, Kerala |

Subfamily Oxythrespinae Giglio-Tos

49. Genus *Heterochaetula* Wood-Mason

- | | |
|---|---|
| <i>H. fassispinis</i> Wood-Mason , 1889 | India, Andhra Pradesh, Karnataka,
Tamil Nadu |
| <i>H. tricolor</i> (Wood-Mason) , 1876 | India, Bihar, Maharashtra, Orissa,
West Bengal |

Subfamily Photininae Giglio-Tos

Tribe Photinini

50. Genus *Beesoniella* Werner

- | | |
|--------------------------------|-------------------|
| <i>B. pallida</i> Werner, 1935 | India, Tamil Nadu |
|--------------------------------|-------------------|

Subfamily Phyllothelinae Beier

51. Genus *Phyllothelys* Wood-Mason

- | | |
|---------------------------------------|--------------------------------------|
| <i>P. decipiens</i> Giglio-Tos , 1915 | India, (Indonesia, Java, Kalimantan) |
|---------------------------------------|--------------------------------------|

- P. weneri* Karny, 1915 India, Uttar Pradesh, (Taiwan)
- P. westwoodi* Wood-Mason, 1876 India, Assam, Uttar Pradesh, (Myanmar)

Subfamily Schizocephalinae Beier

52. Genus *Schizocephala* Audinet- Serville

- S. bicornis* (Linnaeus), 1758 India, Kerala, Madhya Pradesh,
Maharashtra, Uttar Pradesh, West Bengal
(Sri Lanka)

Subfamily Tarachodinae Handlirsch

53. Genus *Didymocorypha* Wood-Mason

- D. lanceolata* (Fabricius), 1798 India, Bihar, Karnataka, Madhya Pradesh,
Rajasthan, Tamil Nadu, Uttar Pradesh,
West Bengal, (Sri Lanka)

54. Genus *Dysaules* Stal

- D. himalayanus*, Wood-Mason, 1889 India, Himachal Pradesh, Madhya
Pradesh
- D. longicollis*. Stal, 1877 India, Karnataka, West Bengal

55. Genus *Oxyophthalma* Saussure

- O. engaea* (Wood-Mason) ,1889 India, Tamil Nadu, (Sri Lanka)
- O. gracilis* Saussure,1869 India, Karnataka,Tamil Nadu, (Sri Lanka)

Subfamily Thespinae Giglio-Tos

Tribe Thespini

56. Genus *Pseudotespis* Mukherjee

- P. meghalayensis* Mukherjee,1985 India, Meghalaya

57. Genus *Thespis* Audinet- Serville

- T. dissimilis* westwood , 1889 India, Madras

Tribe Parathespini

58. Genus *Parathespis* Saussure

- P. humberiana* Saussure ,1869 India, Andra Pradesh, Madhya Pradesh,
Tamil Nadu, (Sri Lanka)

Subfamily Toxoderinae Giglio-Tos

Tribe Toxoderini

59. Genus *Aethalochroa* Wood-Mason

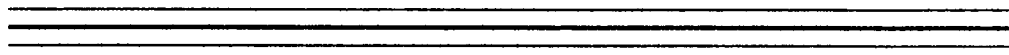
- A. ashmoliana* (Westwood),1841 India, Kerala, Maharashtra, Orissa,
West Bengal

- A . insignis* Wood-Mason, 1878 India, North India
- A . simplicipes* Wood-Mason , 1878 India, Maharashtra
60. Genus *Cheddikulama* Henry
- C . straminea* Henry, 1932 India, Kerala, Uttar Pradesh, (Sri Lanka)
61. Genus *Euthyphleps* Wood-Mason
- E . curtipes* (Westwood), 1889 India, Maharashtra
- E . rectivenis* Wood-Mason, 1889 India, Himachal Pradesh
62. Genus *Loxomantis* Giglio-Tos
- L . indica* Giglio-Tos , 1914 India, Tamil Nadu
63. Genus *Paradanuria* Wood-Mason
- P . orientalis* Wood-Mason , 1877 India, Karnataka
- P . parvula* Westwood , 1889 India?
64. Genus *Toxoderopsis* Wood- Mason
- T . spinigera* Wood-Mason , 1889 India, Kerala, Maharashtra
- T . taurus* Wood-Mason , 1889 India, Bihar, Orissa, (Pakisthan)
65. Genus *Toxomantis* Giglio-Tos
- T . westwoodi* Giglio-Tos , 1914 India, Karnataka

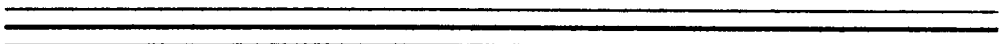
FAMILY METALLYTICIDAE Chopard

- 66 . Genus *Metallyticus* Westwood
- M . splendidus* Westwood , 1835 India , Kerala (Peninsular Malaysia
Sumatra, Borneo)

12/19



Summary



SUMMARY

The present systematic study of Order Mantodea Burmester (=Mantoidea or Manteodea) reveals that the mantid fauna of Kerala is fascinating and consists of 4 families, 26 genera, and 37 species. They have been studied and analysed systematically. Besides this, one species *Parathespis humbertiana* Saussure has also included in this work as extralimital species because of its collection from an area adjacent to the region of present study.

In the present investigation 4 species have been described new to Science. 25 species, 14 genera and 4 subfamilies are new record for Kerala.

Following are the new records of subfamilies for Kerala: 1. Subfamily Hymenopodinae, 2. Subfamily Liturgusinae, 3. Subfamily Schizocephalinae, 4. Subfamily Toxoderinae.

Following are new records of genera for Kerala: 1. *Ambivia* Stal, 2. *Euantissa* Giglio-Tos, 3. *Hestiasula* Saussure, 4. *Humbertiella* Saussure, 5. *Scizocephala* Audinet-Serville, 6. *Elmantis* Giglio-tos, 7. *Mantis* Linnaeus, 8. *Plistospilota* Beier, 9. *Statilia* Stal, 10. *Deiphobella* Giglio-Tos, 11. *Iris* Saussure, 12. *Aethalochroa* Wood-Mason, 13. *Cheddikulama* Henry, 14. *Toxoderopsis* Wood-Mason

Summary of the systematic analysis of the Families, Subfamilies, genera, and species of Order Mantodea (=Mantoidea or Manteodea) is given below:

I. FAMILY AMORPHOSCELDAE Stal

Subfamily Amorphoscelinae Kirby

Genus *Amorphoscelis* Stal

A. annulicornis Stal

II. FAMILY EMPUSIDAE Burmeister

Subfamily Empusinae Saussure

Genus *Gongylus* Thunberg

G. gongylodes (Linnaeus)

III. FAMILY HYMENOPODIDAE Chopard

Subfamily Acromantinae Giglio-Tos

Tribe Acromantini Beier

Genus *Acromantis* Saussure

A. insularis Giglio-Tos

A. montana Giglio-Tos*

Genus *Ambivia* Stal*

A. popa Stal*

Genus *Anaxarcha* Stal

A. limbata Giglio-Tos

Genus *Euantissa* Giglio-Tos*

E. pulchra (Fabricius)*

Genus *Hestiasula* Saussure*

H. brunneriana Saussure*

Subfamily Hymenopodinae Giglio-Tos*

Genus *Creobroter* Audinet-Serville*

C. apicalis saussure*

IV. FAMILY MANTIDAE Burmeister

Subfamily Amelinae Giglio-Tos

Tribe Amelini Beier

Genus *Amantis* Giglio-Tos

A. malabarensis sp. nov.*

Genus *Cimantis* Giglio-Tos*

C. testacea Werner*

C. fuliginosa Werner*

Genus *Elmantis* Giglio-Tos*

E. trincomaliae (Saussure)*

Subfamily Caliridinae Giglio-Tos

Genus *Leptomantis* Giglio-Tos

L. parva Werner

Subfamily Iridopteryginae Giglio-Tos

Genus *Hapalopeza* Stal

H. trissurensis sp. nov.*

H. periyara Mukherjee & Hazra

Subfamily Liturgusinae Giglio-Tos*Genus *Humbertiella* Saussure**H. affinis* Giglio-Tos**H. ceylonica* Saussure**H. similis* Giglio-Tos***Subfamily Mantinae Kirby**

Tribe Mantini Beier

Genus *Hierodula* BurmeisterSubgenus *Hierodula* (*Hierodula*) Giglio-Tos*H. (H). bipapilla* Audinet-Serville**H. (H). keralensis* sp. nov.**H. (H). membranacea* Burmeister*H. (H). saussurei* Kirby**H. (H). tenuidentata* Saussure**H. (H). ventralis* Giglio-Tos*Subgenus *Hierodula* (*Rhombodera*) Giglio-Tos*H. (R). woodmasoni* Werner*Genus *Mantis* Linnaeus**M. religiosa* Linnaeus*Genus *Plistospilota* Beier**P. nova* Beier*Genus *Statilia* Stal**S. maculata* (Thunberg)**S. nemoralis* (Saussure)*Genus *Tenodera* Burmeister*T. superstitiosa* (Fabricius)*

Tribe Miomantini*

Genus *Deiphobella* Giglio-Tos**D. laticeps*(Wood-Mason)*Genus *Iris* Saussure**Iris keralensis* sp.nov*.**Subfamily Schizocephalinae Beier***Genus *Schzocephala* Audinet-Serville**S. bicornis* (Linnaeus)***Subfamily Thespiinae Giglio-Tos**

Tribe Parathespini Beier

Genus *Parathespis* Saussure*P. humbertiana* Saussure**Subfamily Toxoderinae Giglio-Tos***

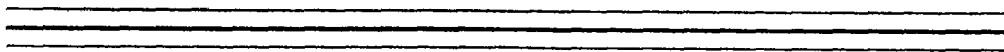
Tribe Toxoderini Beier*

Genus *Aethalochroa* Wood-Mason**A. ashmoliana* (Westwood)*Genus *Cheddikulama* Henry**C. straminea* Henry*Genus *Toxoderopsis* Wood-Mason**T. spinigera* Wood-Mason*

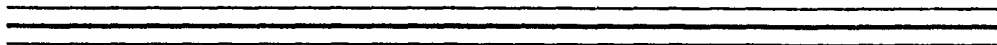
* New records for Kerala

All the above mentioned species were properly identified and described. Detailed redescriptions were given in the case of poorly described species. Six coloured plates containing 22 species of mantids are also included in this work. Apart from this a check list of Mantodea of Indian subcontinent, key to Indian families, subfamilies, genera and species of order Mantodea have been furnished. All the type specimens are kept in the collection of DZCU and ZSIC.

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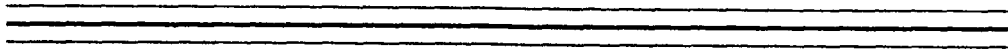
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Plates and Figures

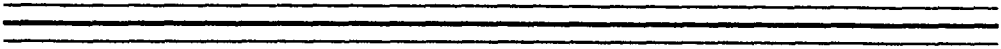


PLATE I High Lands



1

**Ever Green Forest
Silent Valley**



2

**Shola Forest
Wynad Wild Life Sanctuary**



3

**Riparian Forest
Parambikulam
Wild Life Sanctuary**

24

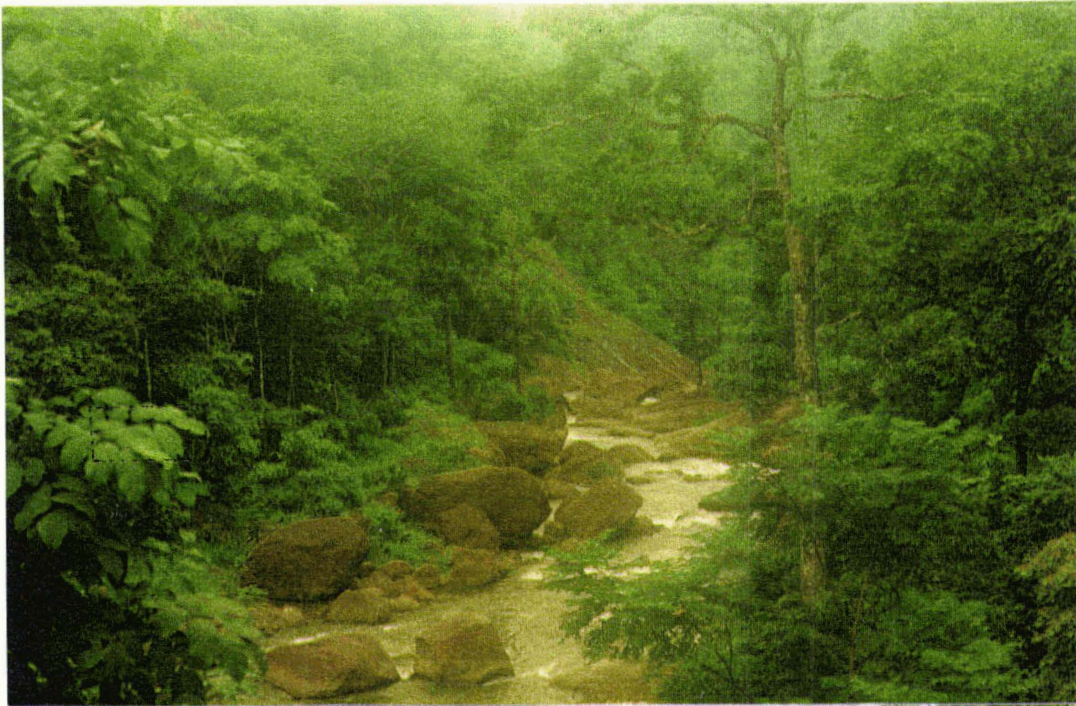


Fig.1

**Semi Ever Green Forest
Thenmala (Quilon)**



Fig.2

**Thorny Forest
Chinnar (Idukki)**

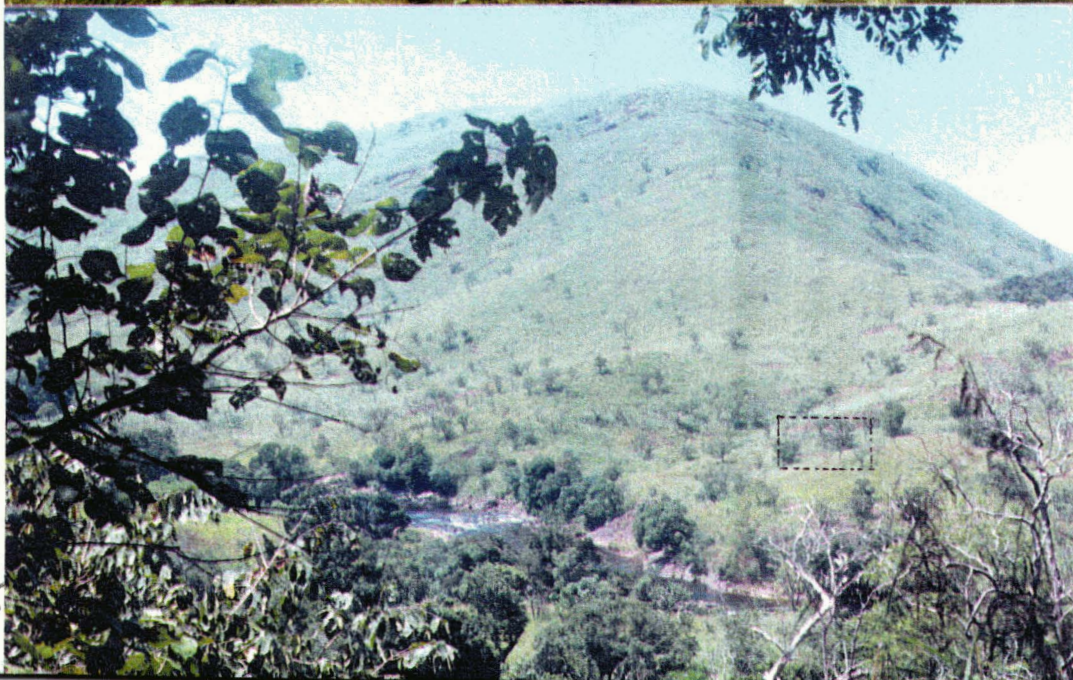


Fig.3

**Grass Lands
Periyar Tiger Reserve**

20



Fig.1

**Deciduous Forest
Nilambur**



Fig.2

**Laterite Hill
Grass Meadow
Madayippara (Kannur)**



Fig.3

**Mixed Vegetation
Calicut
University Campus**

27

PLATE IV Low Lands



Fig.1

**Mangroove Ecosystem
Kolavippalam (Calicut)**



Fig.2

**Home Premises
Kovoov (Calicut)**



Fig.3

**Fringes of Paddy Fields
Vellayinikkara
(Trissur)**



Fig.1 *Acromantis montana* Giglio-Tos



Fig.2 *Ambivia popa* Stal



Fig.3 *Anaxarcha limbata* Giglio -Tos

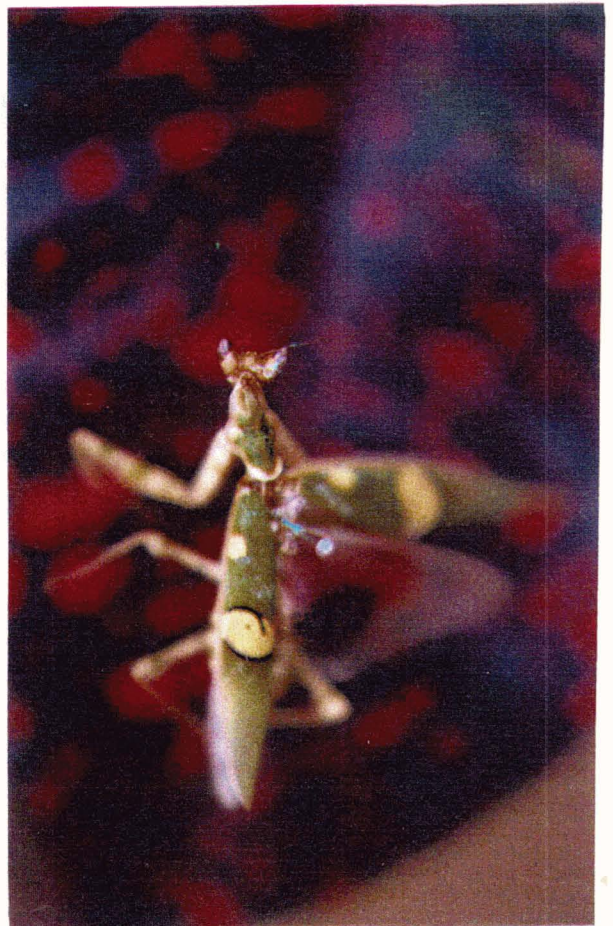


Fig.4 *Crebroter apicalis* Saussure

275



Fig.1. *Hestiasula brunneriana* Saussure



Fig.2. *Humbertiella affinis* Giglio-Tos

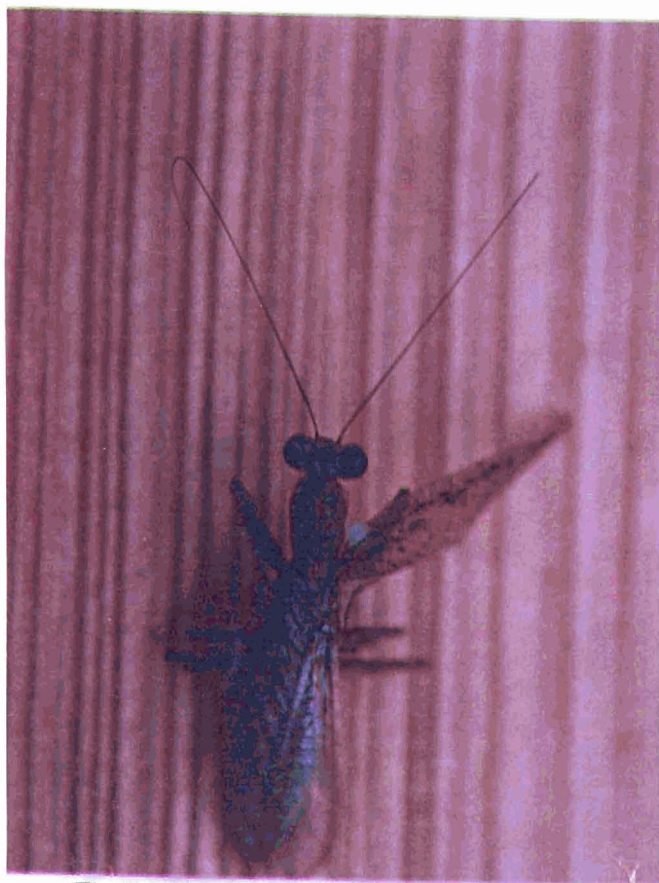


Fig.3. *Humbertiella similis* Giglio-Tos



Fig.4. *Schizocephala bicornis* (Linnaeus)

26

275 H

PLATE VII



Fig.1. *Leptomantis parva* Werner



Fig.2. *Mantis religiosa* Linnaeus Variation



Fig.3. *Stalilia nemoralis* (Saussure)

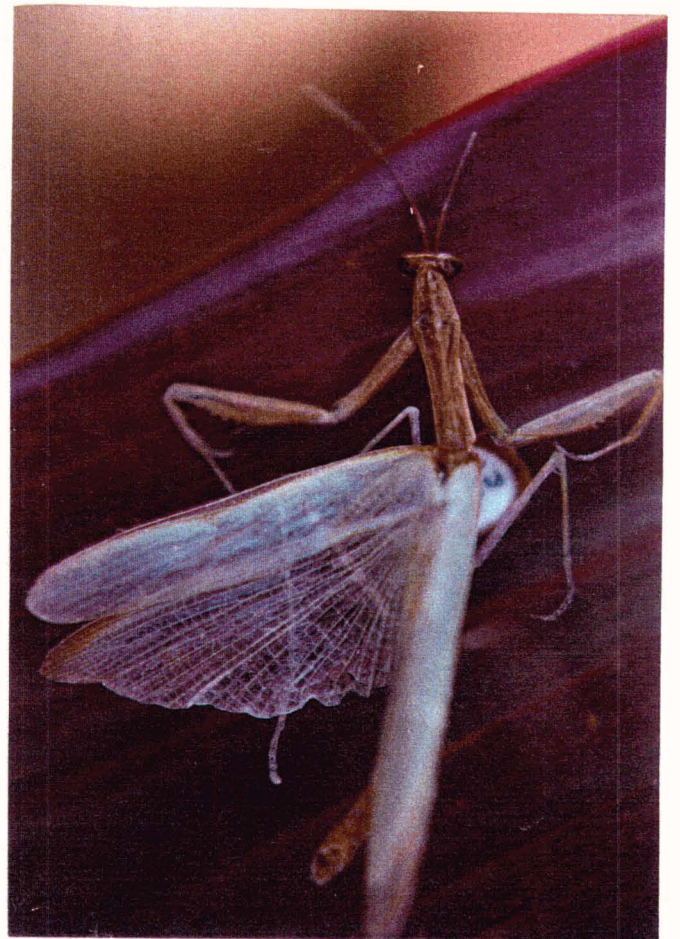


Fig.4. *Mantis religiosa* Linnaeus

27



Fig.1

Hierodula(Hierodula) ventralis Giglio-Tos



Fig.2

Hierodula(Hierodula) membranacea (Burmeister)

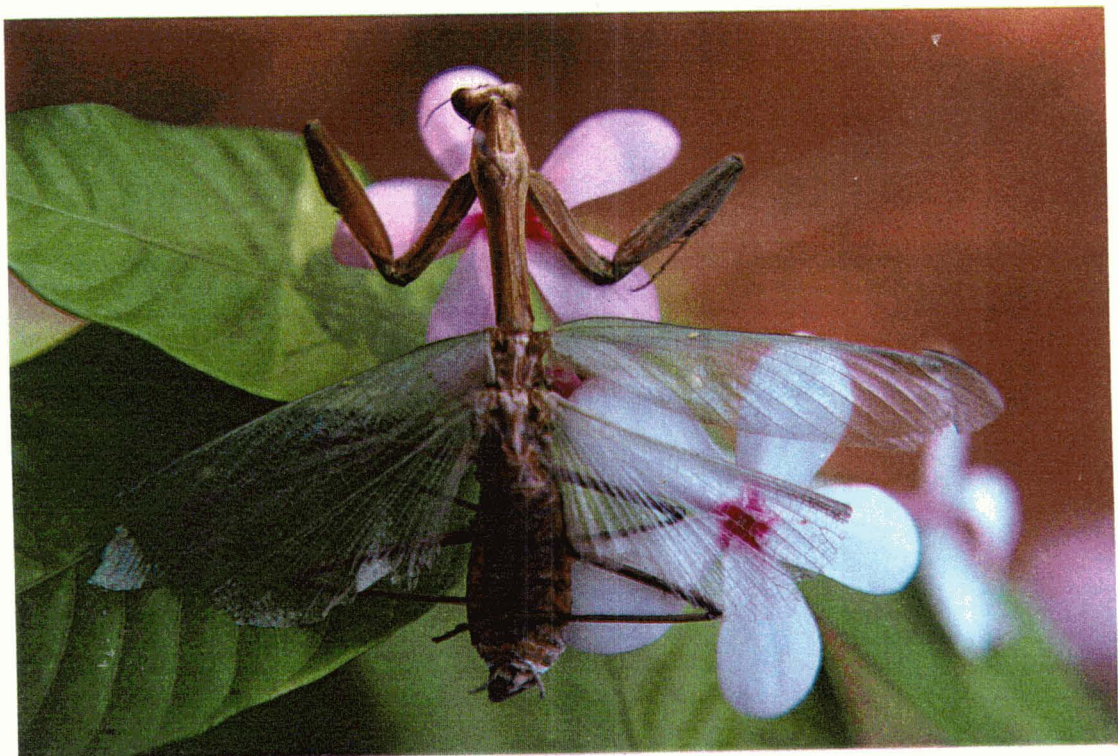


Fig.3

Hierodula(Hierodula) keralensis sp. nov.

275 J

PLATE IX



Fig.1. *Hierodula (Rhombodera) woodmasoni* Wemer



Fig.2. *Plistospilota nova* Beier



Fig.3. *Diephobella laticeps* (Wood-Mason)



Fig.4. *Gongylus gongylodus* (Linnaeus)

29



Fig.1

Fig.2

Aethalochroa ashmoliana (Westwood)

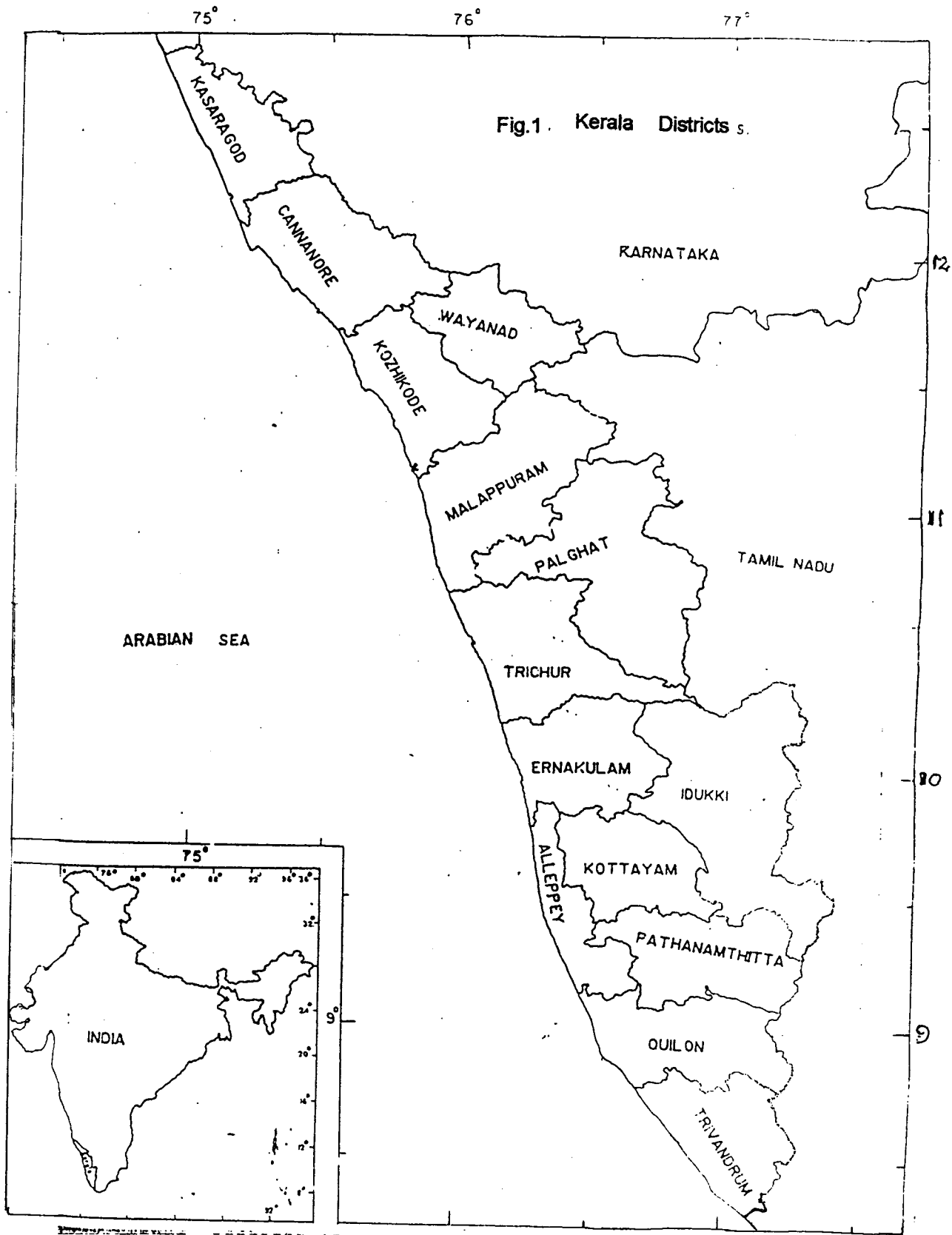
Cheddikulama straminea Henry



Fig.3

Toxoderopsis spinigera Wood-Mason

30



21570

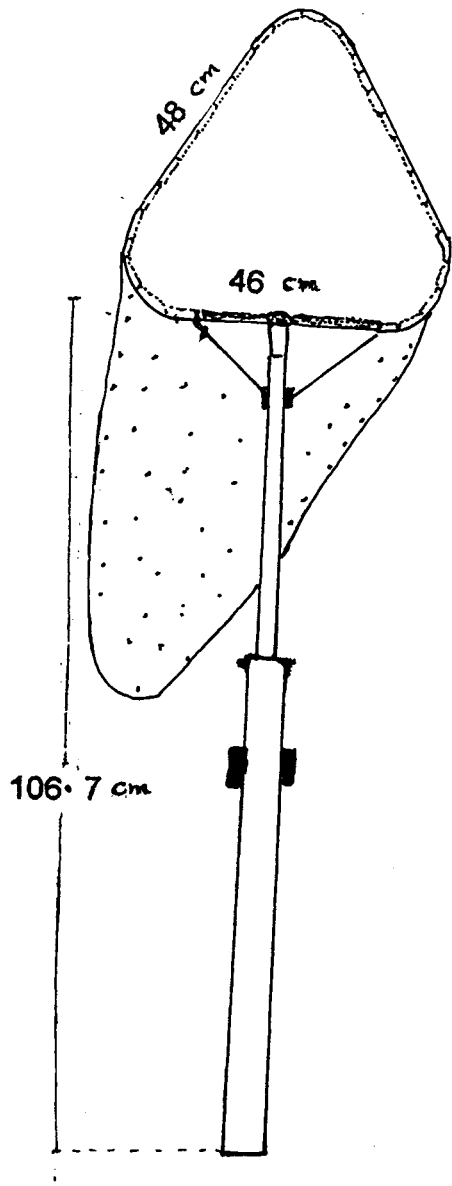


Fig.2 Sweep net

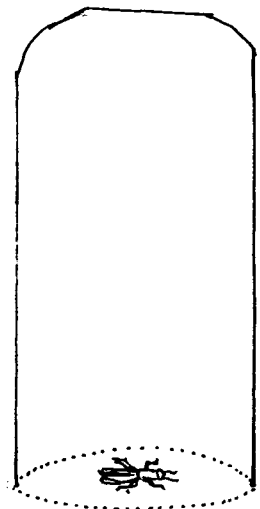


Fig.3 Glass Specimen Tube

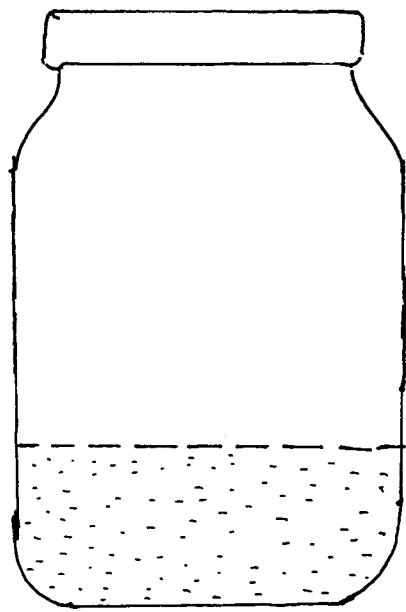


Fig.4 Killing Bottle

32

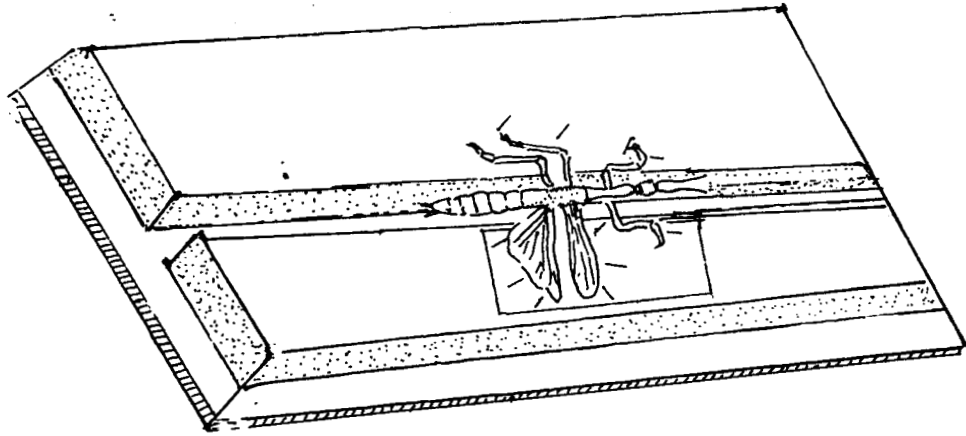


Fig.6 Spreading Board

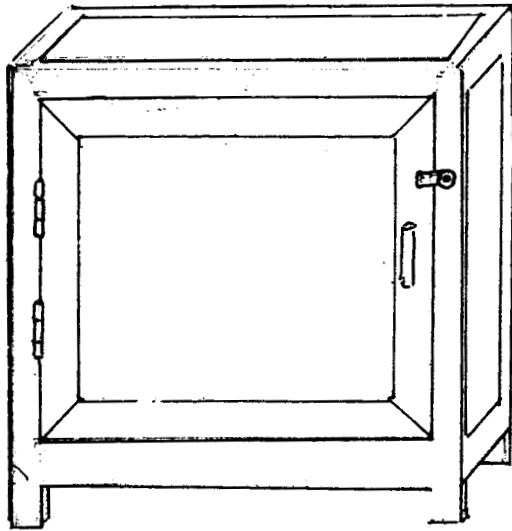


Fig.5 Rearing Cage

Head Dorsal View

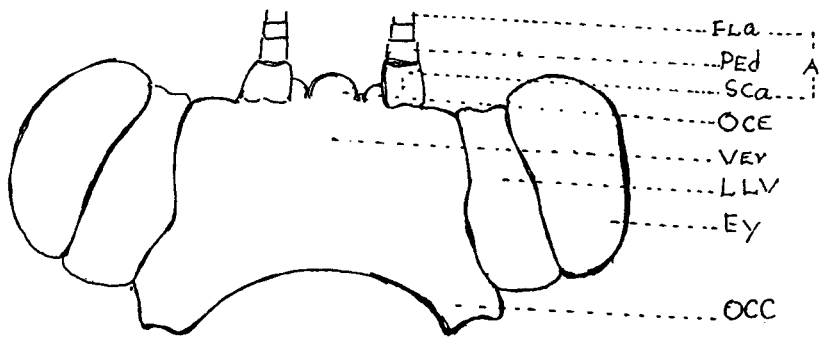
(Fig. 8)

A - Antenna
Fla- Flagellum
SCa- Scape
PEd- Pedicel
OCe- Ocellus
EY- Eye
VEr- Vertex
LLV- Lateral Lobes of Vertex
OCC- Occiput

Head Ventral View

(Fig. 9)

Asc- Antennal scape
Cly- Clypeus
FSS- Superior margin of frontal sclerite
FSD- Disc of frontal sclerite
FSI- Inferior margin of frontal sclerite
Gn- Gena
La- Labrum
Lab- Labial Palps
Lo- Lateral Ocelli
Mo- Median ocellus



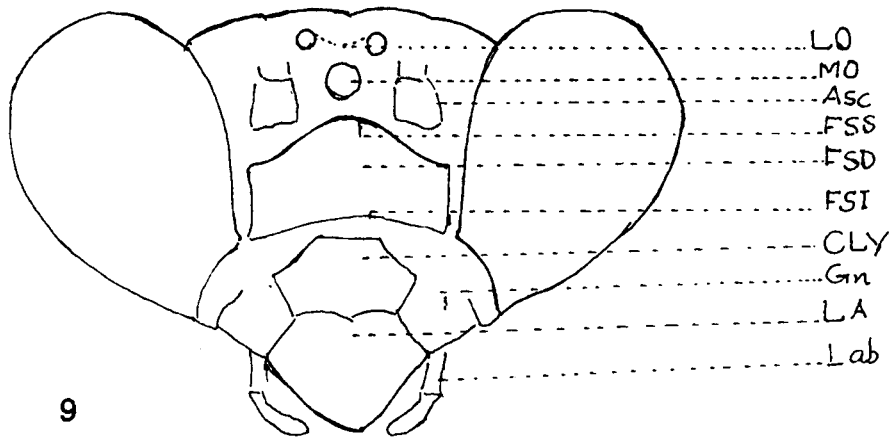
8

Head Dorsal view



7

Antenna (Filiform)



9

Head Ventral view

Mesosoma

(Fig 10)

MTZ- Metazona

MZC- Metazonal Constriction

PRZ- Prozona

SCD- Supra coxal Dialation

Metasoma

(Fig 13)

SAP- Supra anal plate

Ci- Cerci

Foreleg

(Fig 11)

C- Coxa

1-Apex

2- Superior Margin

3- Submarginal spines

InA-Internal apical lobe

F- Femur

5- Internal spines

6- Discoidal spines

7- External spines

T- Tibia

8- Tibial spines

9- Tibial claw

Mt- Metatarsus

Ots- Other tarsal segments

A- Arolium

Tc- Tarsal claw

TR-Trochanter

Hindleg

(Fig 12)

C- Coxa

F- Femur

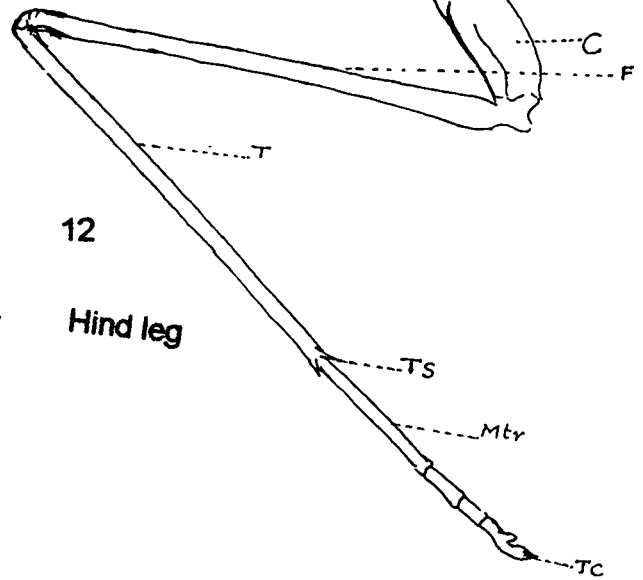
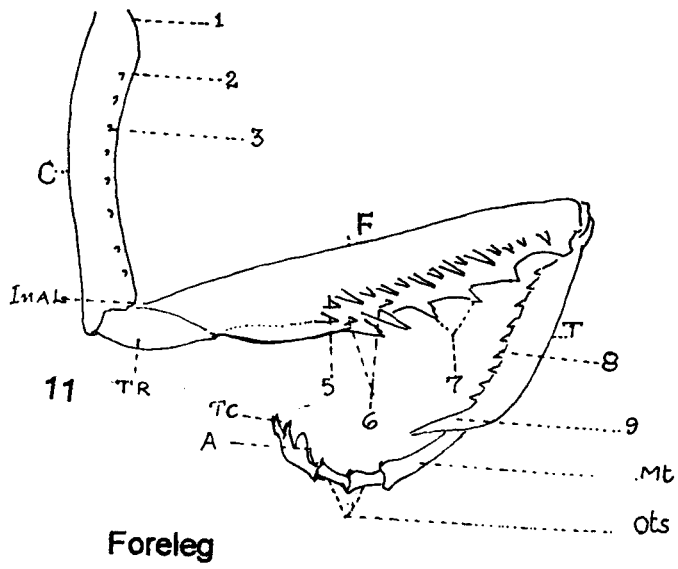
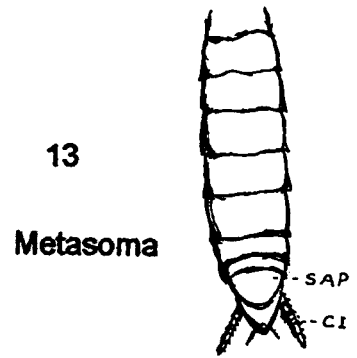
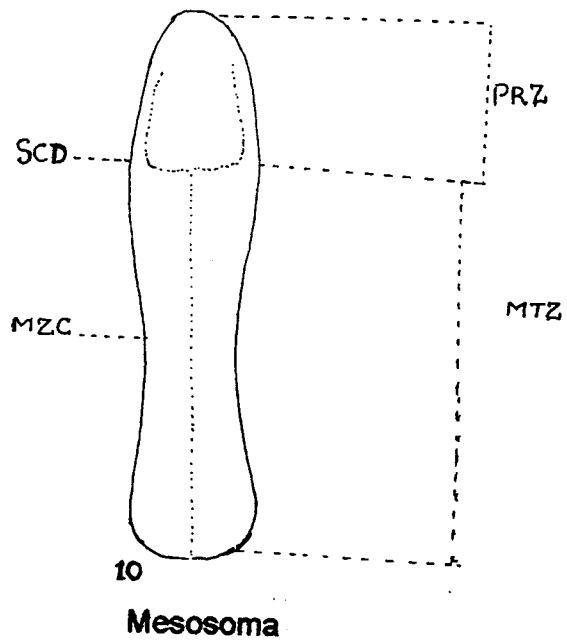
T- Tibia

TS- Tibialspine

Mtr-Metatarsus

A- Arolium

Tc- Tarsal claw



Forewing

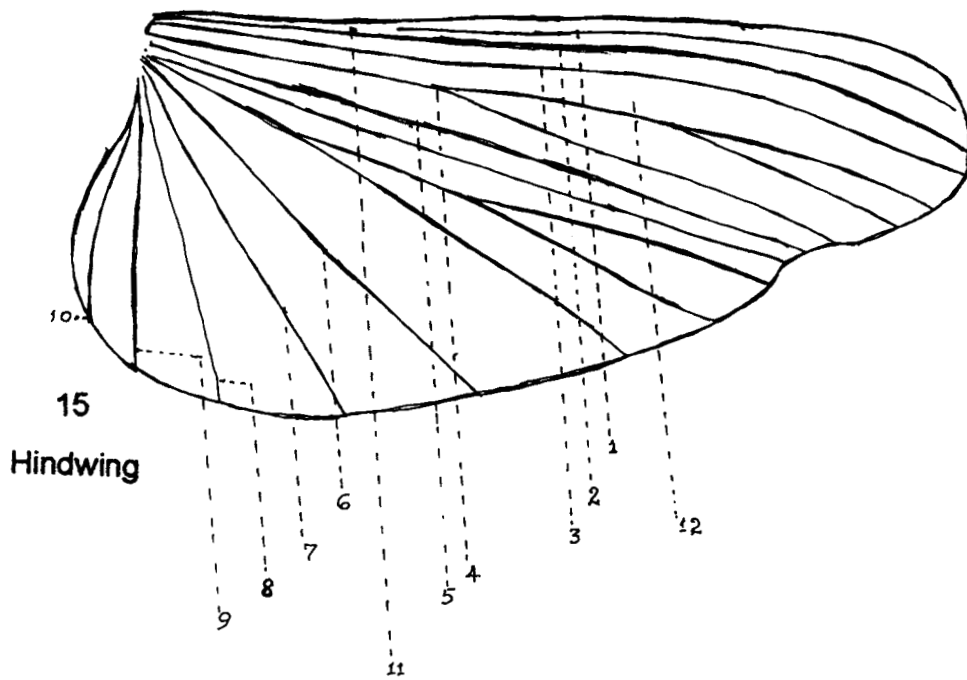
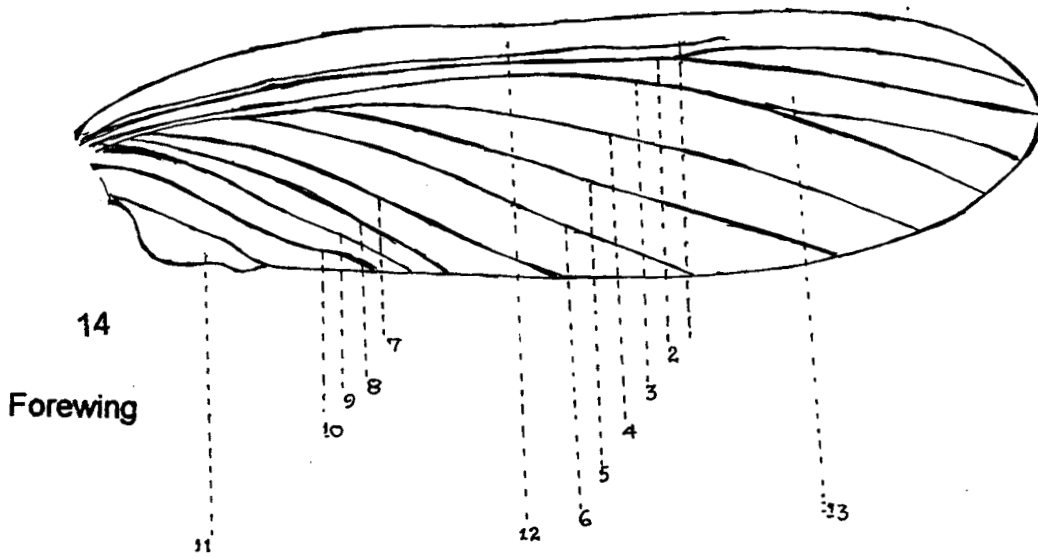
(Fig 14)

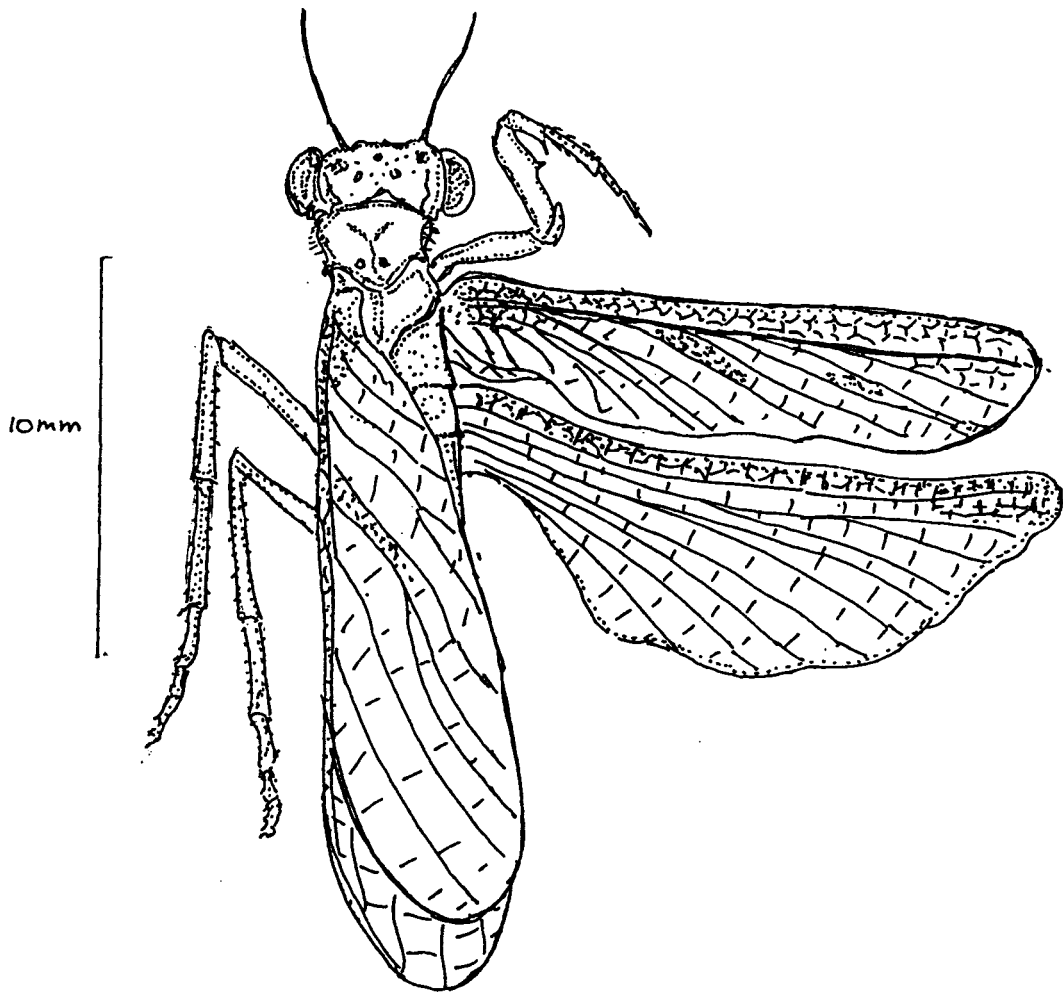
1. Precostal vein
2. Costal vein (Mediastinal vein)
3. Subcostal vein (Anterior radial vein)
4. Radial vein (Post radial vein)
5. Cubitus I (Discoidal vein)
6. Cubitus II (Ulnare vein)
- 7 –10. Anal veins
11. Anal membrane
12. Costal area
13. Discoidal area

Hindwing

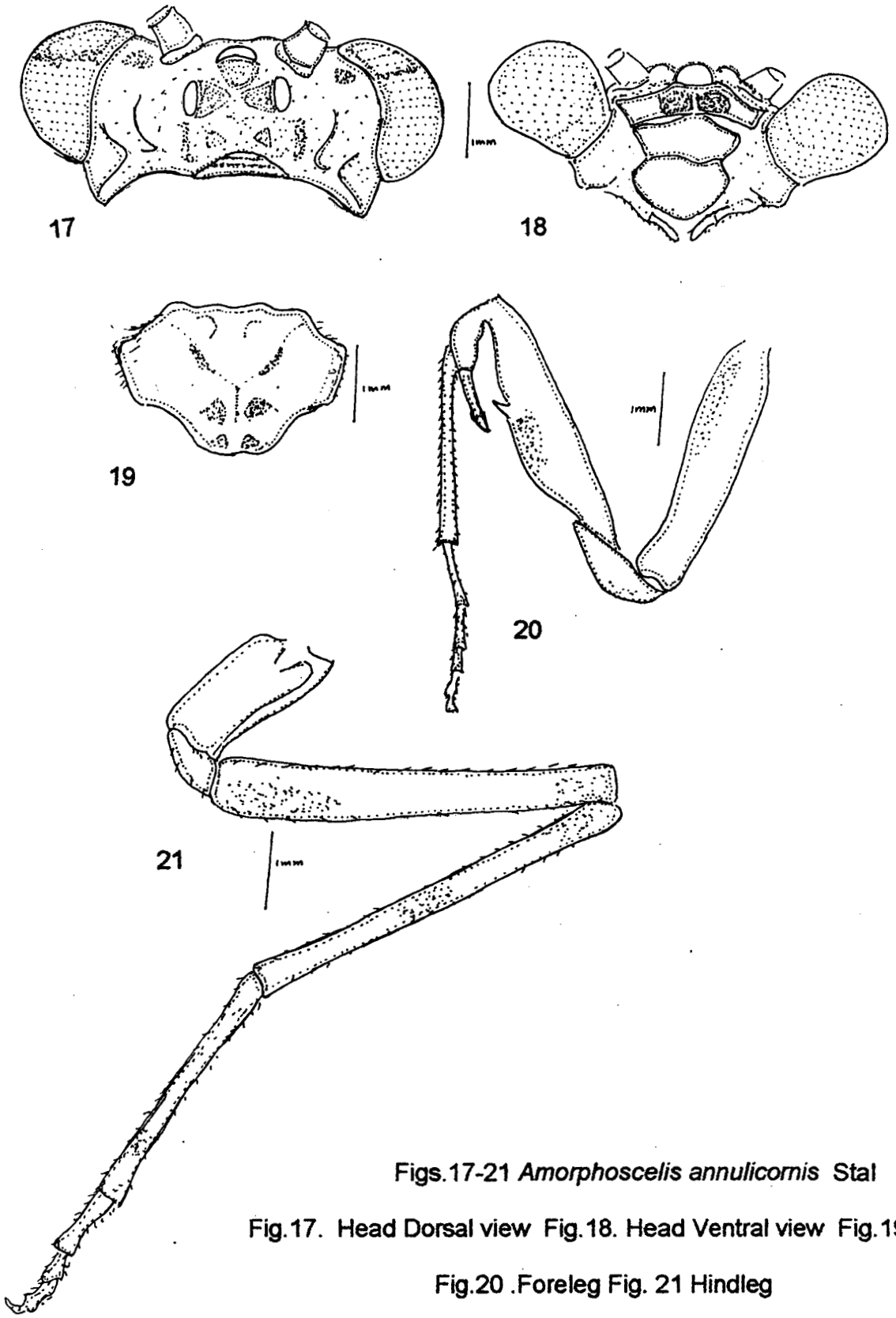
(Fig 15)

1. Costal vein
2. Subcostal vein
3. Radial vein
4. Cubitus I
5. Cubitus II (Post cubitus)
- 6 –10. Anal veins
11. Costal area
12. Discoidal area





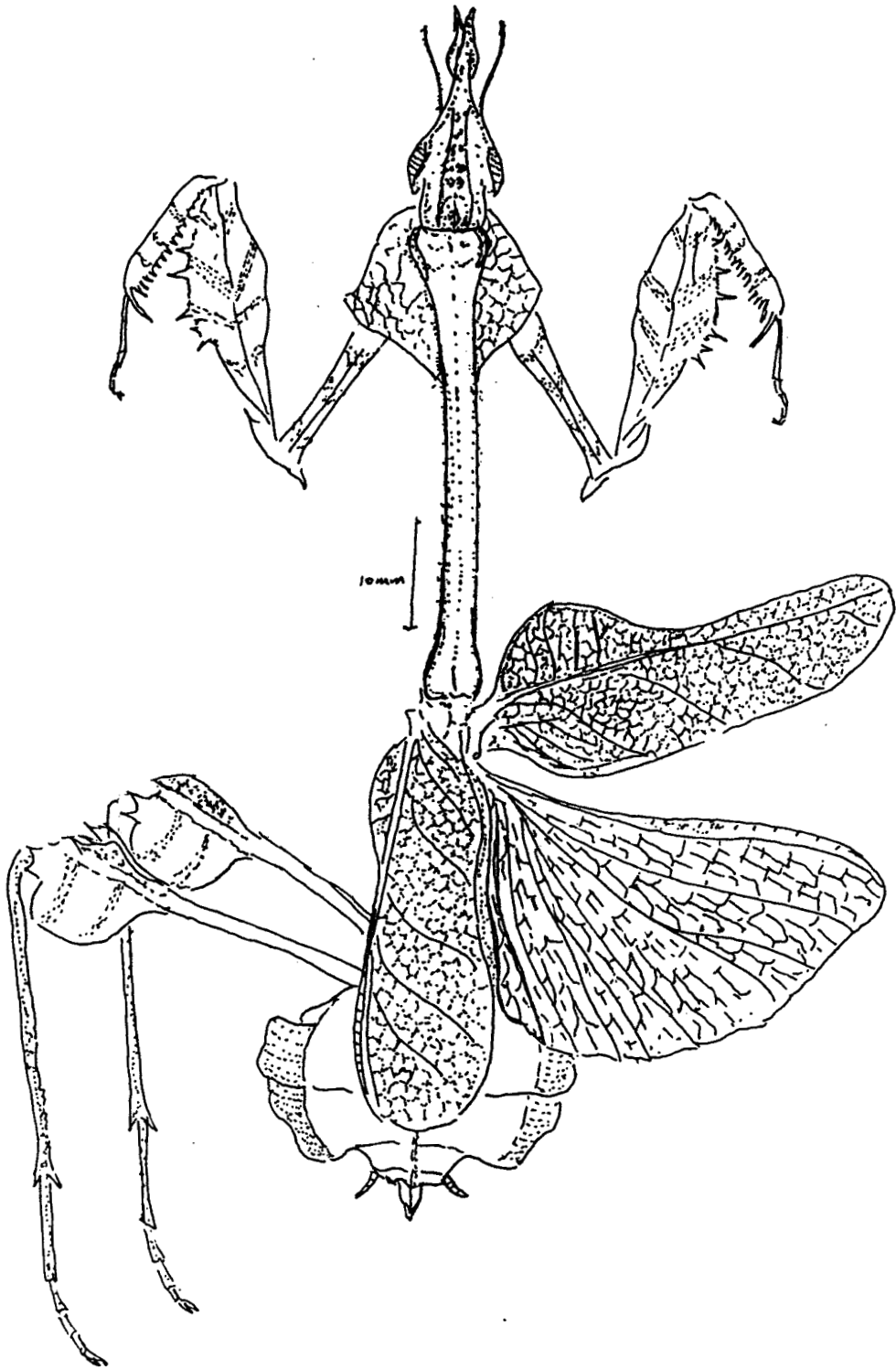
16 *Amorphoscelis annulicornis* Stal



Figs.17-21 *Amorphoscelis annulicornis* Stal

Fig.17. Head Dorsal view Fig.18. Head Ventral view Fig.19. Metasoma

Fig.20 .Foreleg Fig. 21 Hindleg

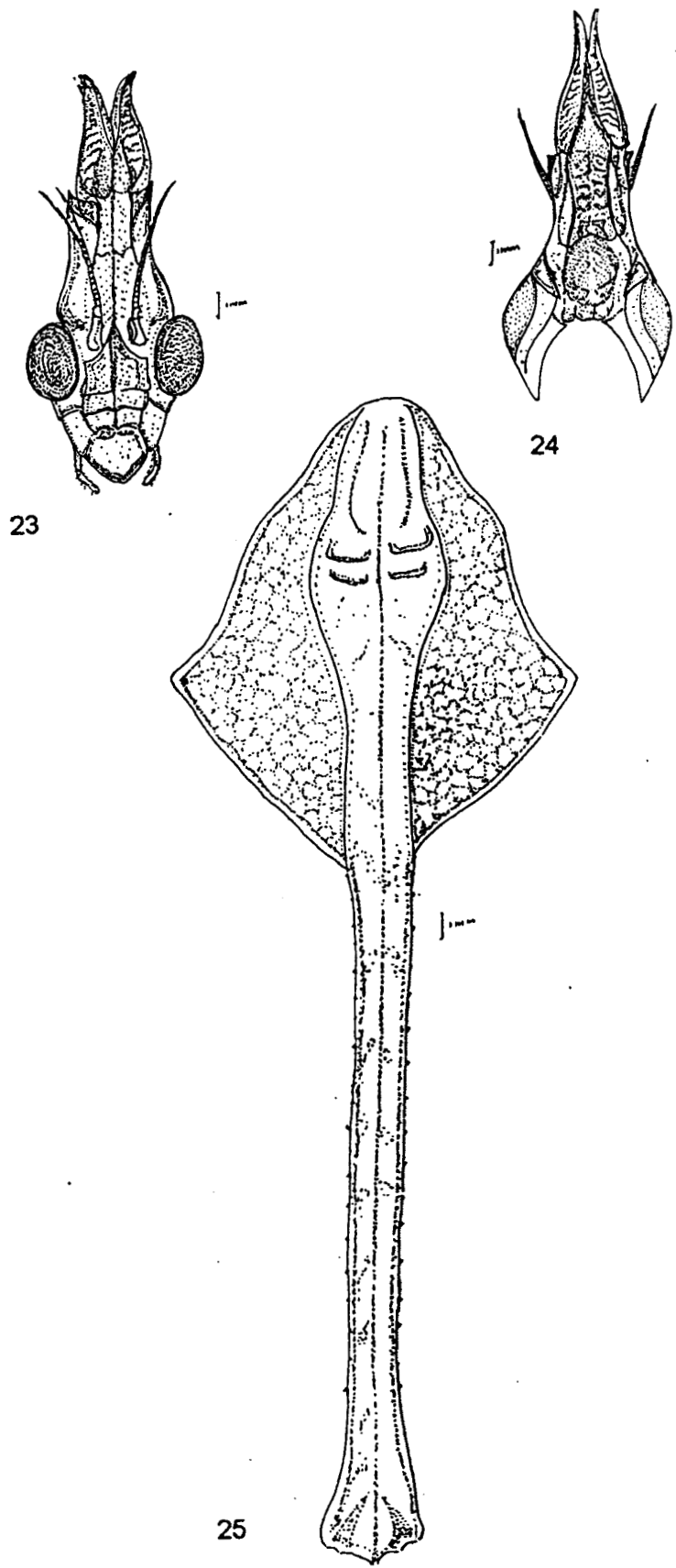


22

Gongylus gongylodus(Linnaeus)

4d

2357



23

24

25

Figs.23-27 *Gongylus gongylodus*(Linnaeus)

Fig.23. Head Ventral view Fig. 24.Head Dorsal view Fig.25. Mesosoma

23

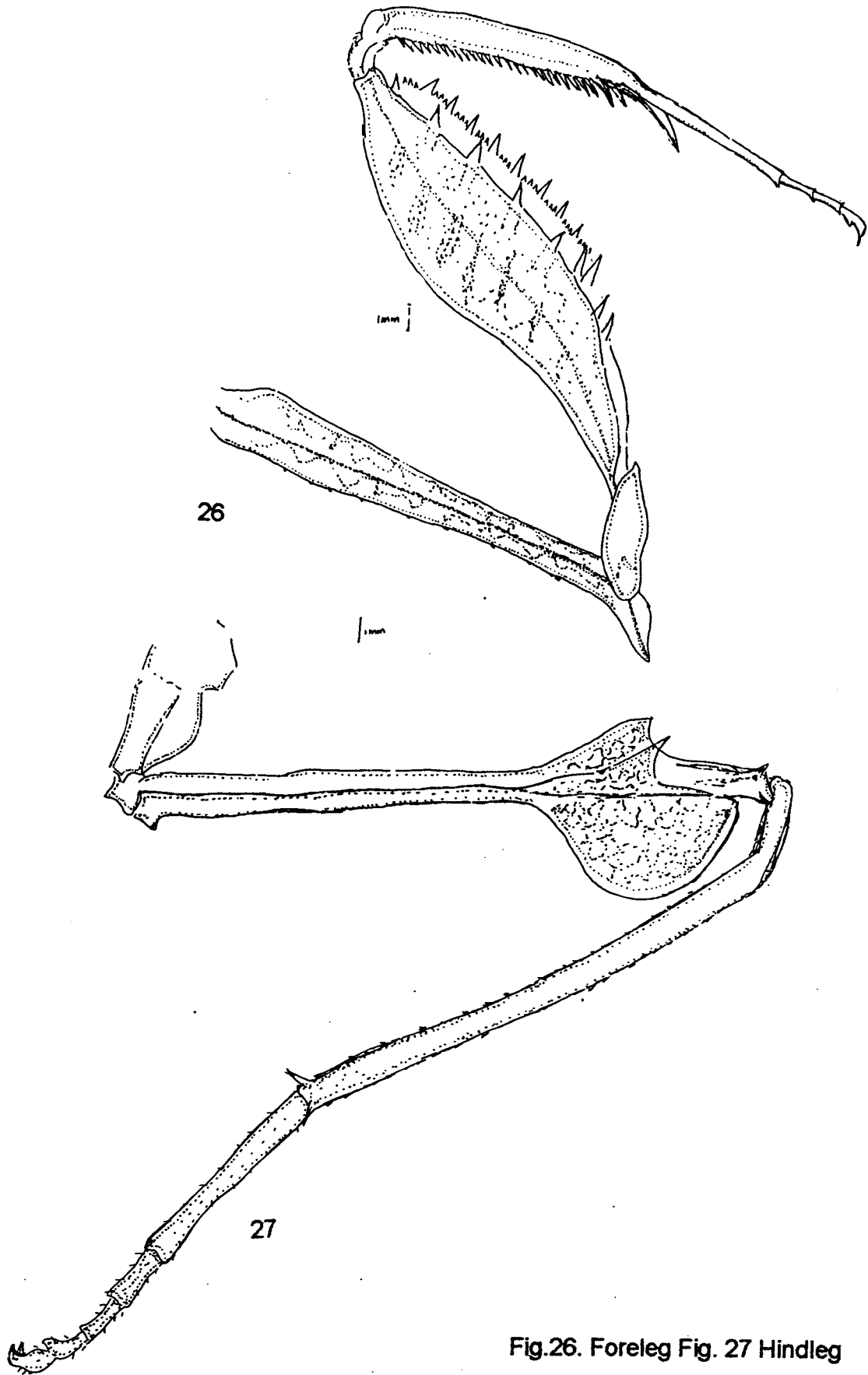
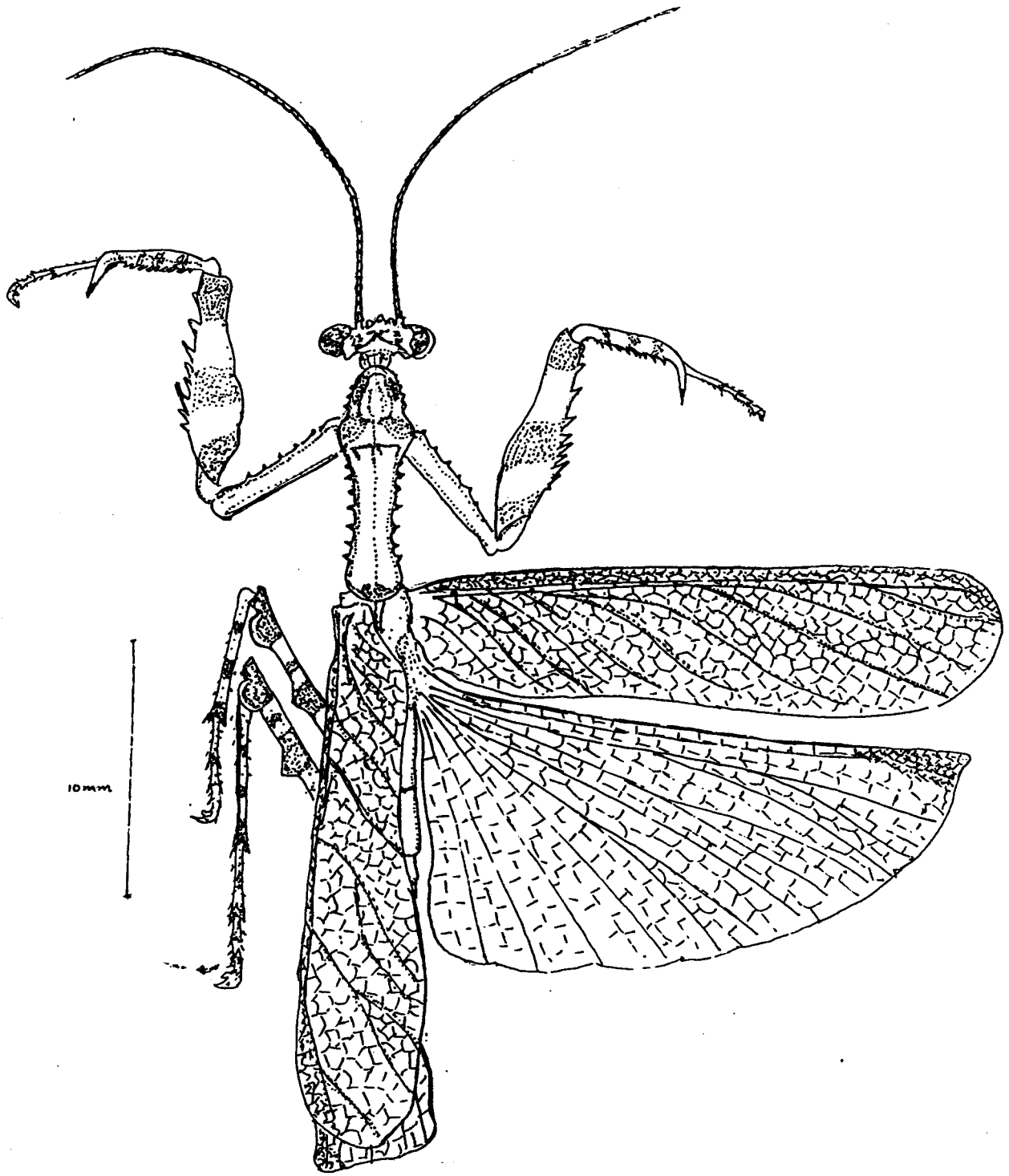


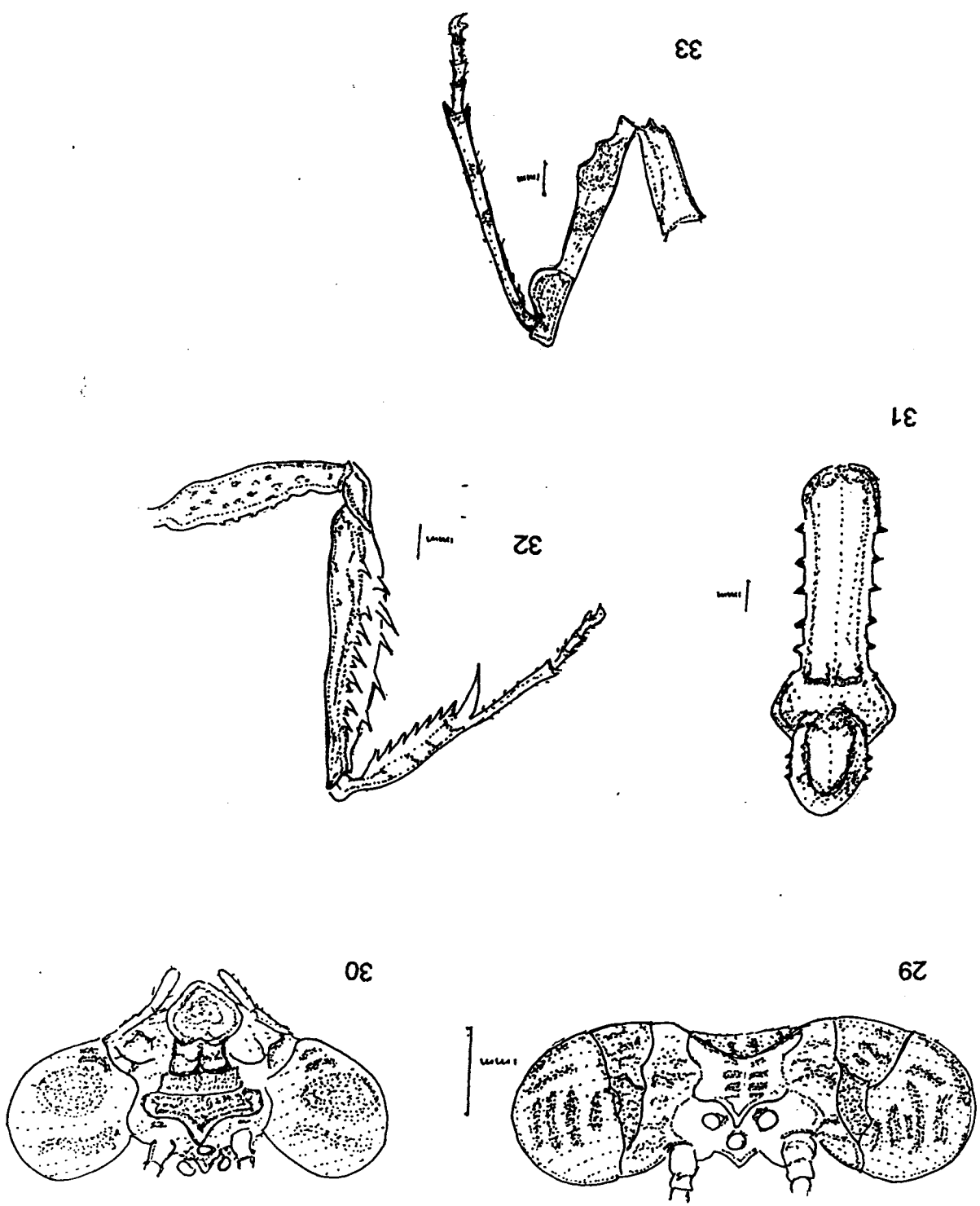
Fig.26. Foreleg Fig. 27 Hindleg

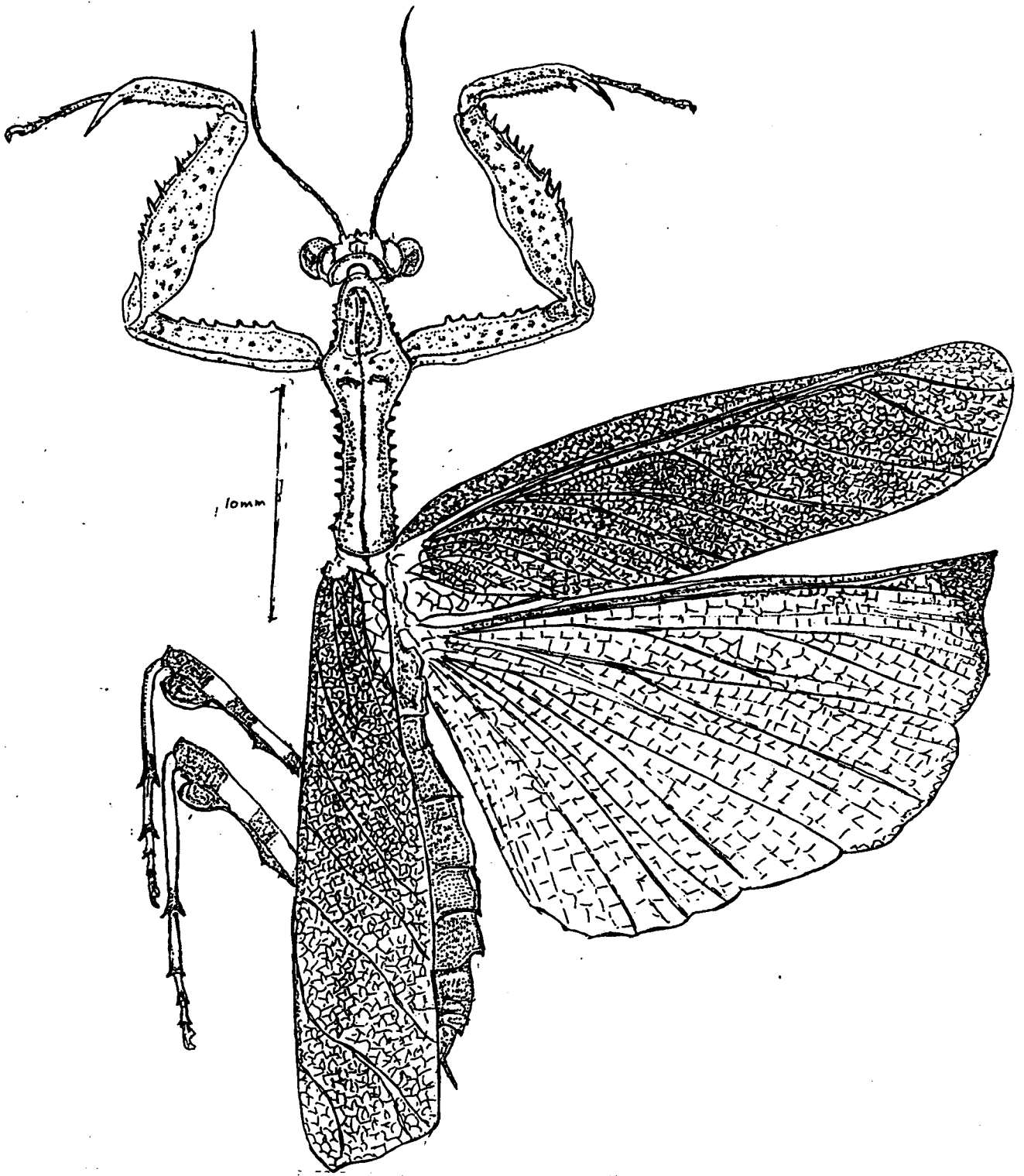


28 *Acromantis insularis* Giglio-Tos

25

Figs. 29-33. *Acromantis insulans* Giglio-Tos
 Fig. 29. Head Dorsal Fig. 30. Head Ventral view Fig. 31. Mesosoma
 Fig. 32. Foreleg Fig. 33. Midleg





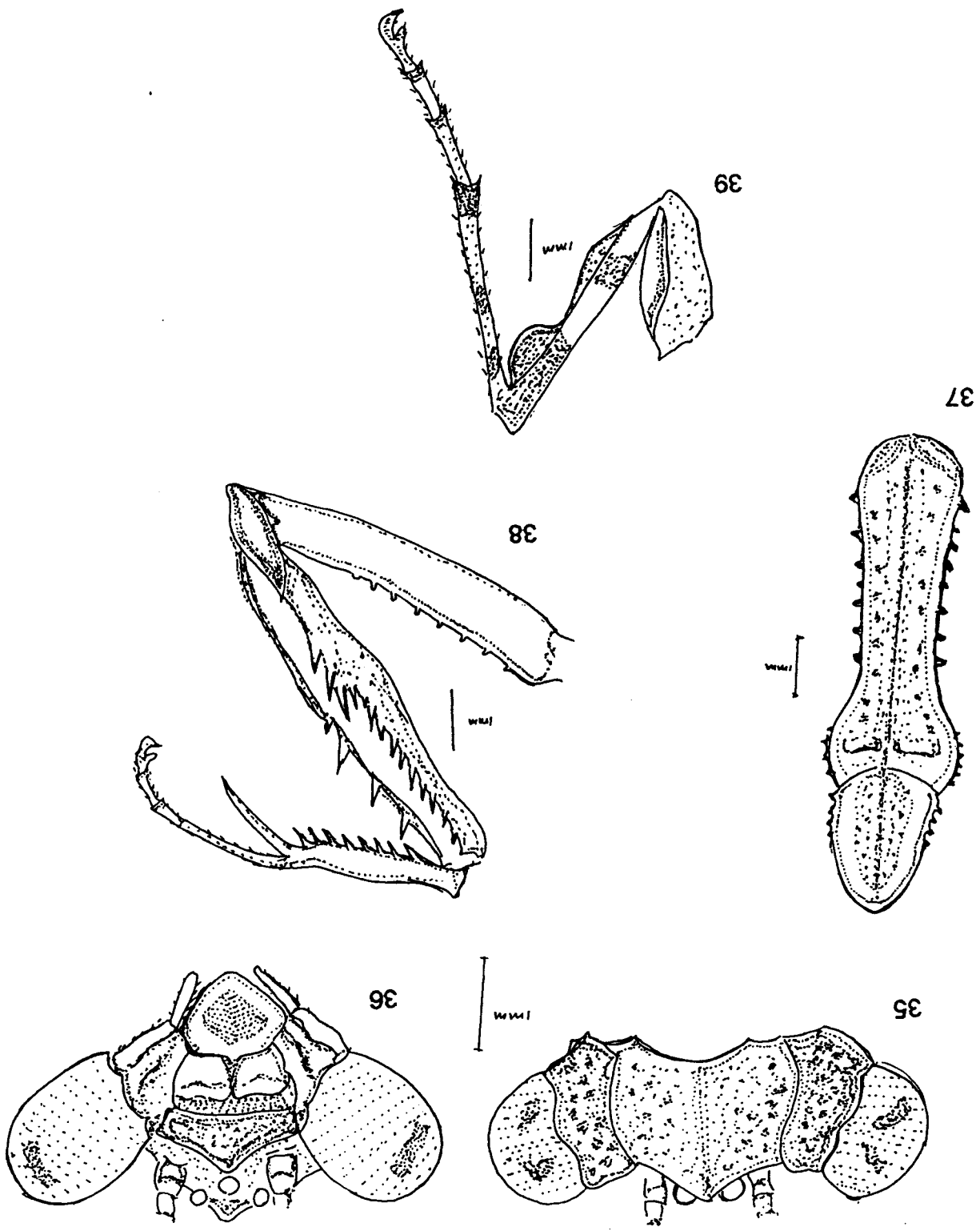
34 *Acromantis montana* Giglio-Tos

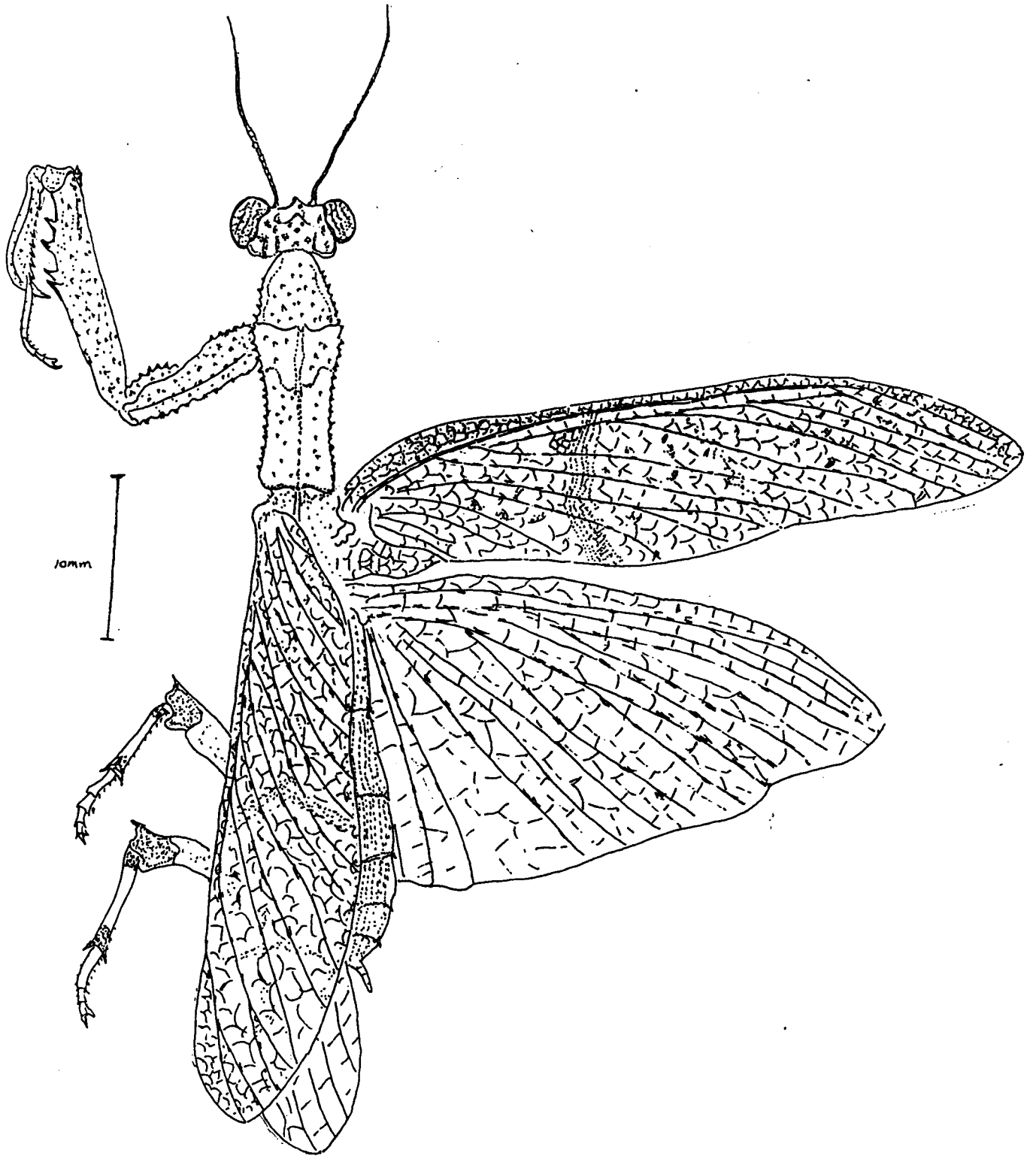
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Fig. 38. Foreleg Fig. 39 Midleg

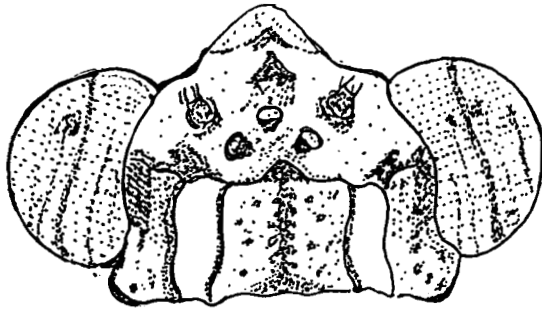
Fig. 35. Head Dorsal Fig. 36. Head Ventral view Fig. 37. Mesosoma

Figs. 35-39. *Acromantis montana* Giglio-Tos

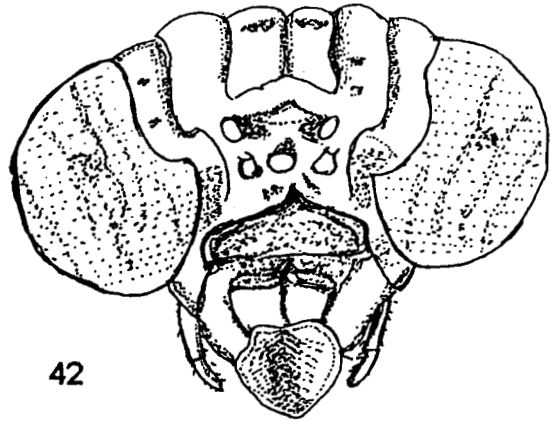




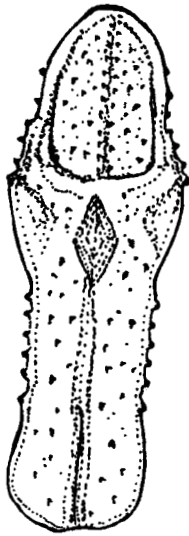
40 *Ambivia popa* Stal



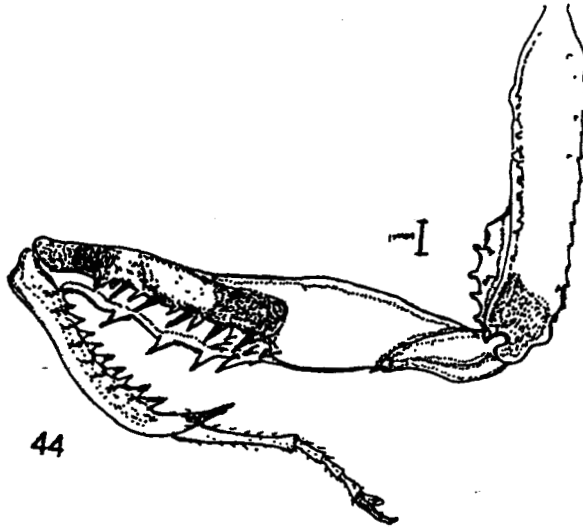
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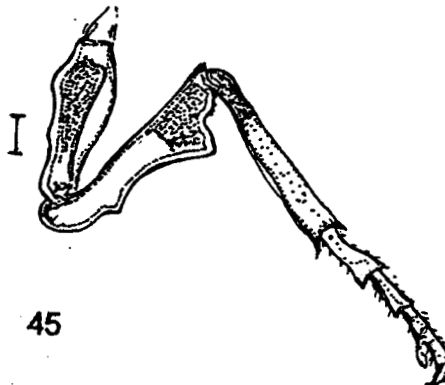
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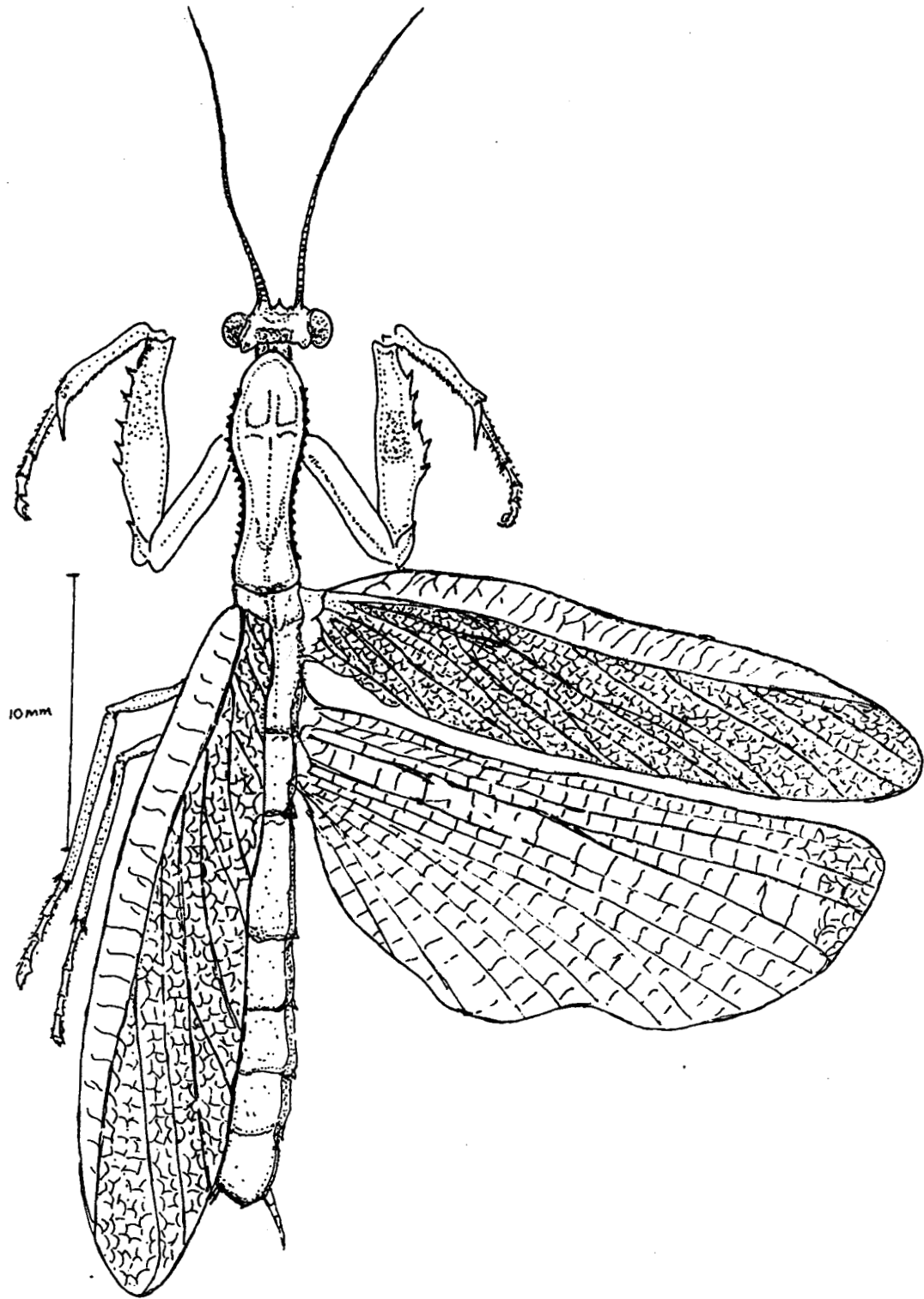
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Figs.41-45. *Ambivia popa* Stal

Fig.41. Head Dorsal view. Fig. 42.Head Ventral view Fig.43. Mesosoma

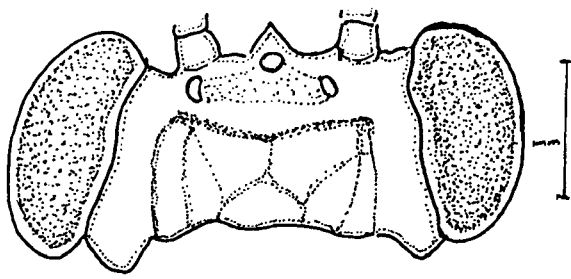
Fig.44. Foreleg Fig. 45. Midleg

76

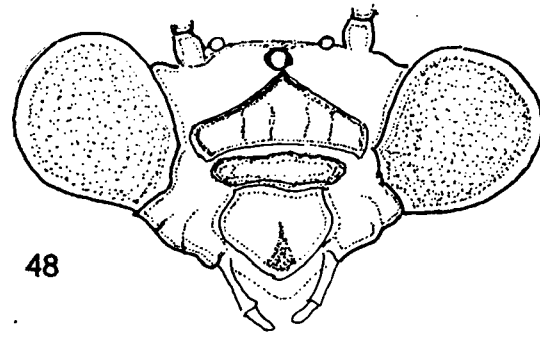


46 *Anaxarcha limbata* Giglio-Tos

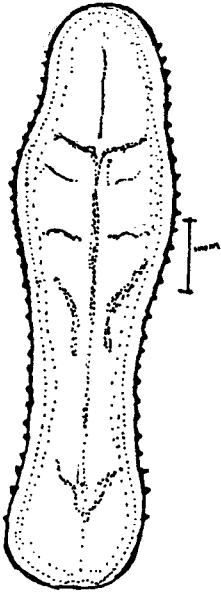
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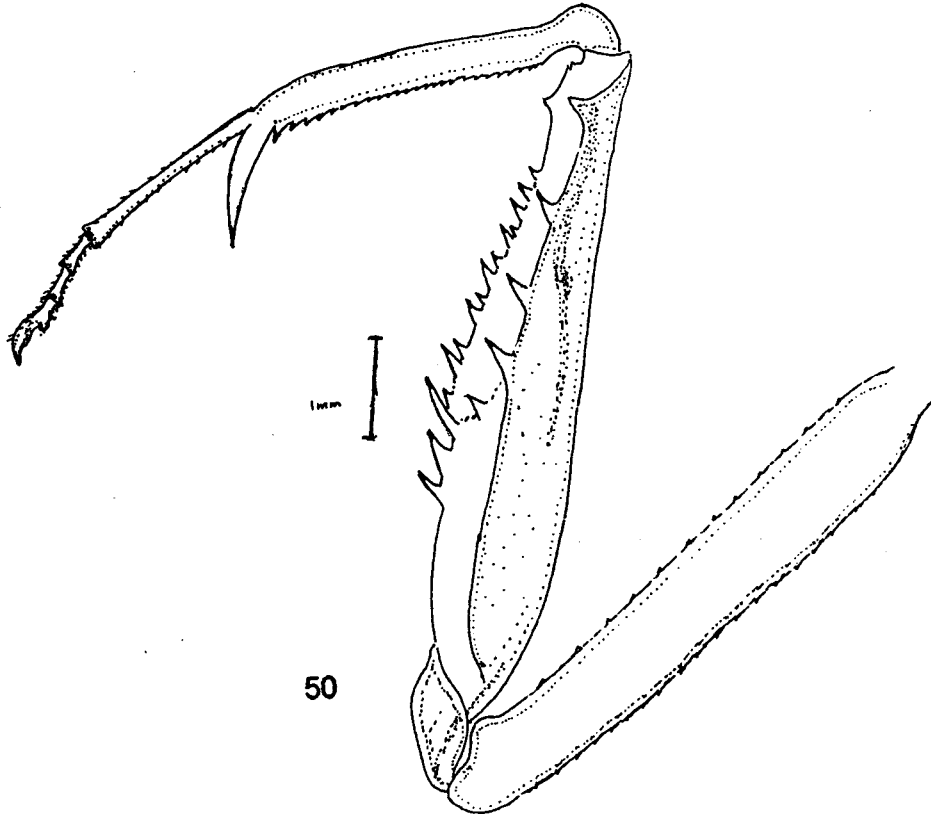
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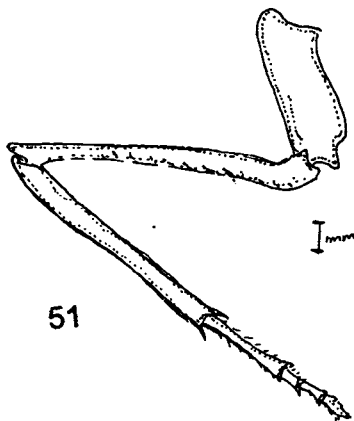
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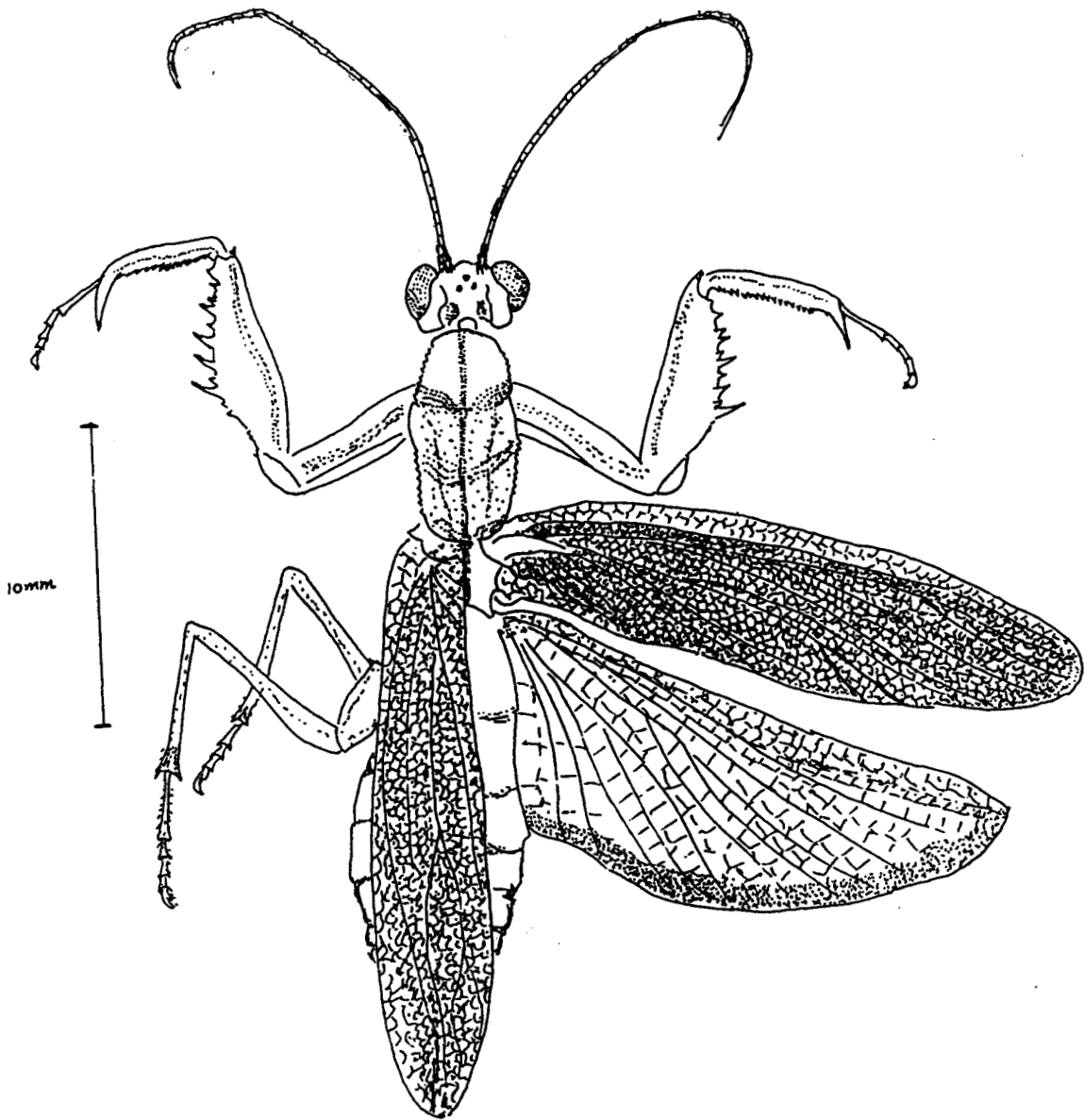
Figs.47-51 *Anaxarcha limbata* Giglio-Tos

Fig.47. Head Dorsal view. Fig. 48.Head Ventral view.Fig.49. Mesosoma

Fig.50. Foreleg Fig. 51. Midleg

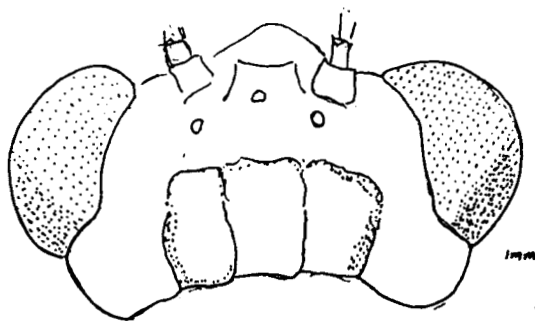
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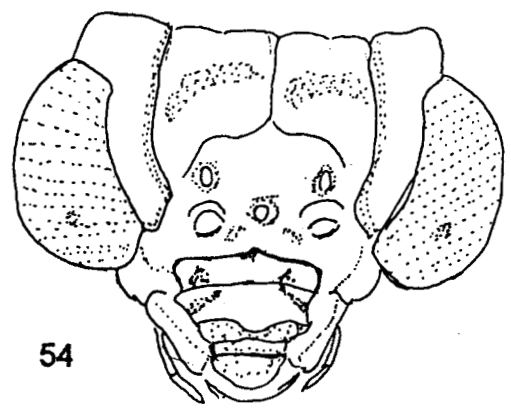


52 *Euantissa pulchra* (Fabricius)

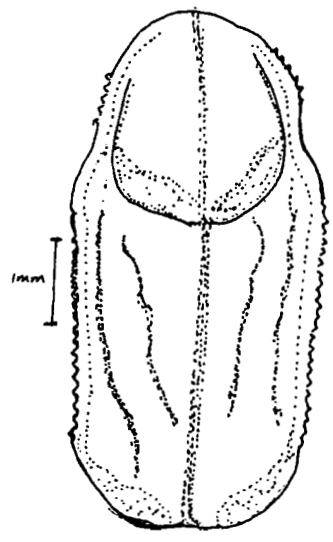
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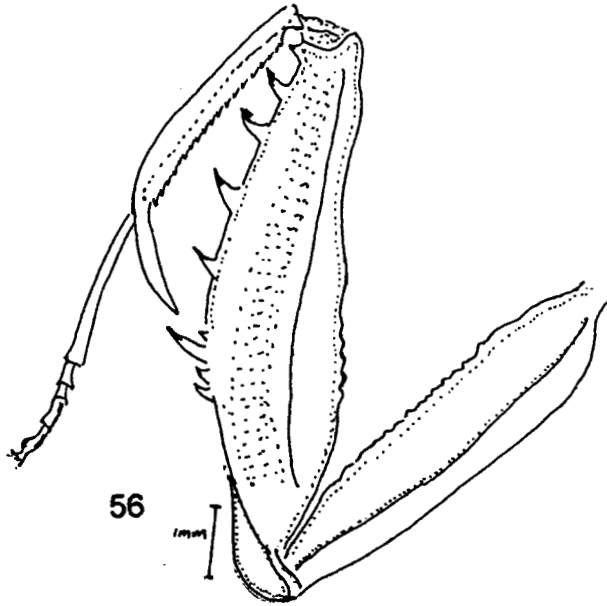
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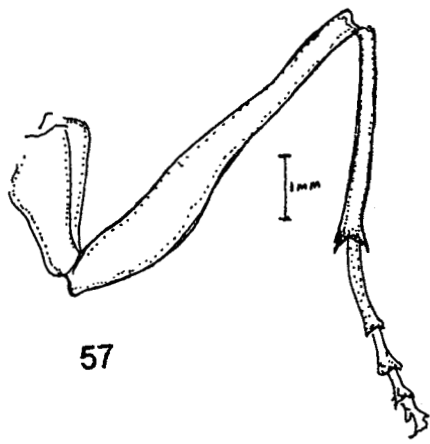
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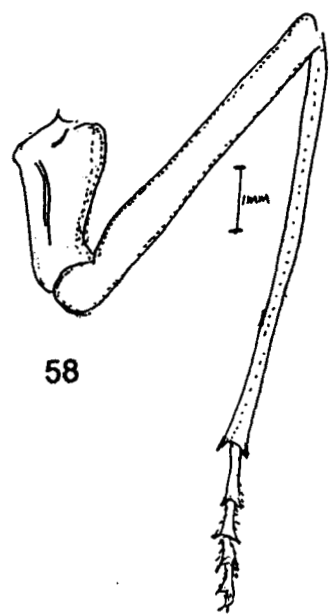
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56



57



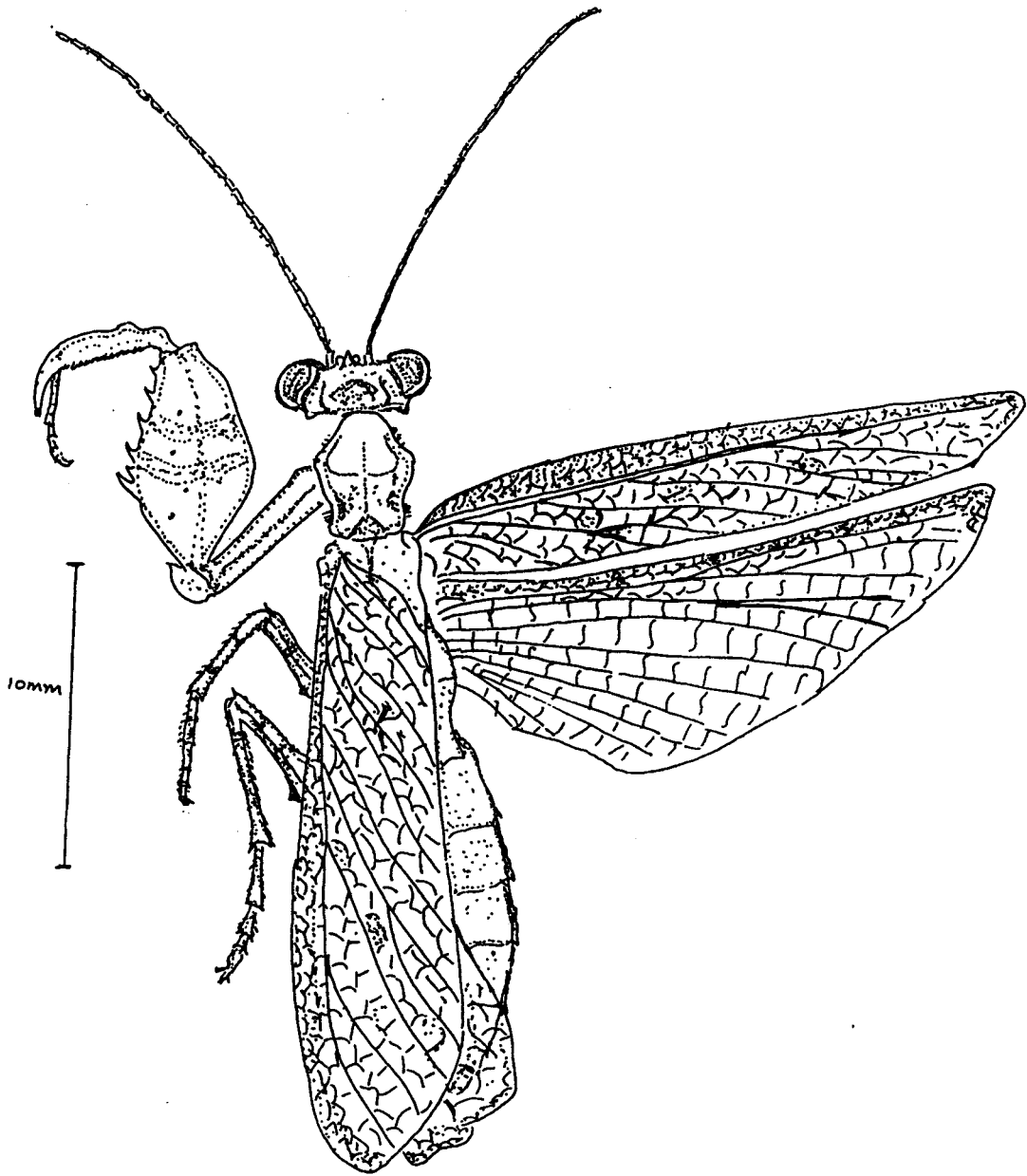
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Figs.53-58 *Euantissa pulchra* (Fabricius)

Fig.53. Head Dorsal view. Fig. 54.Head Ventral view Fig.55. Mesosoma

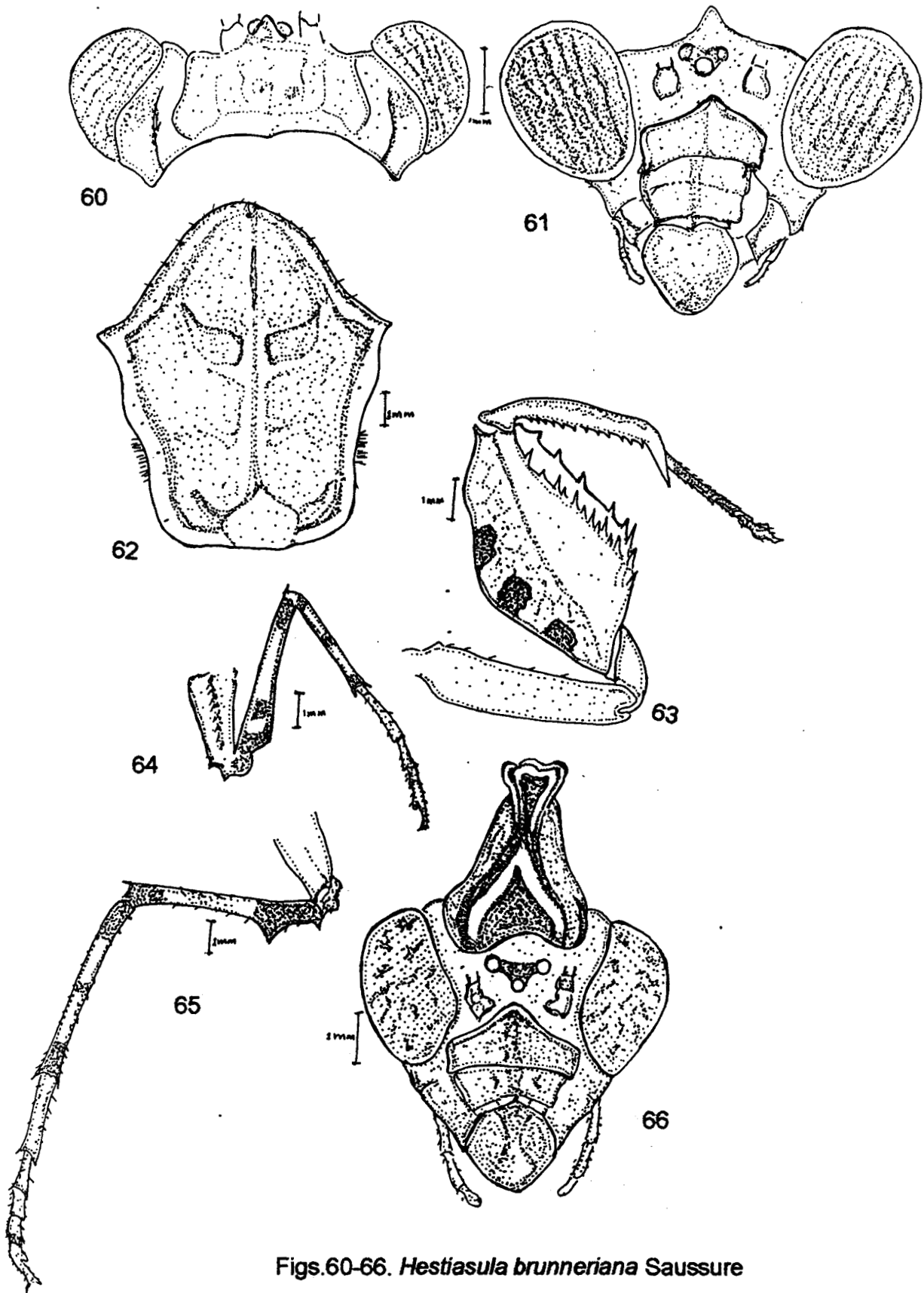
Fig.56. Foreleg. Fig. 57. Midleg. Fig.58 Hindleg

50



59 *Hestiasula brunneriana* Saussure

55

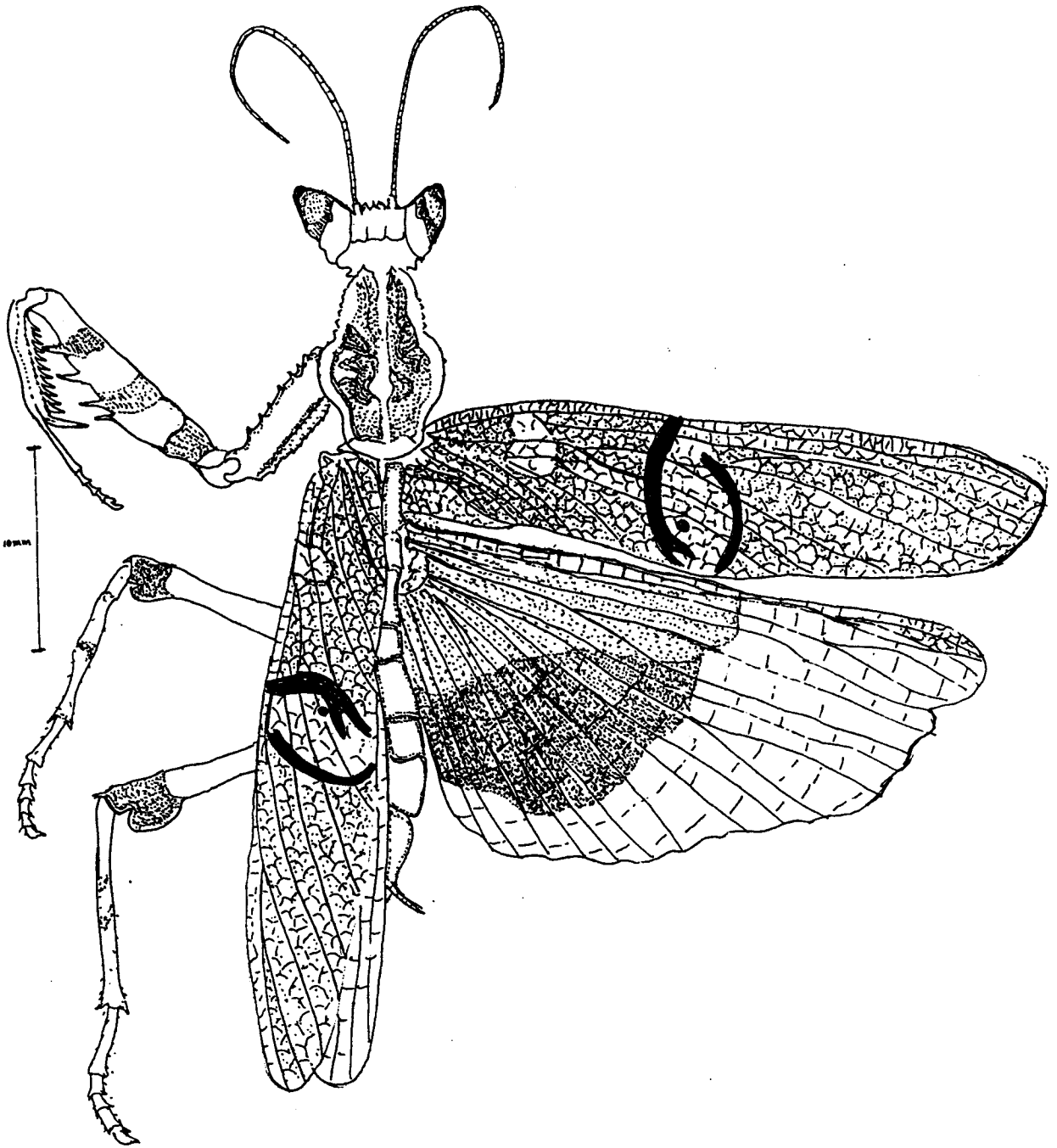


Figs.60-66. *Hestiasula brunneriana* Saussure

Fig.60. Head Dorsal view. Fig. 61.Head Ventral view Fig.62. Mesosoma

Fig.63.Foreleg. Fig. 64.Midleg. Fig.65 Hindleg

Fig.66 female Head Ventral view



67 *Creobroter apicalis* Saussure

Fig.

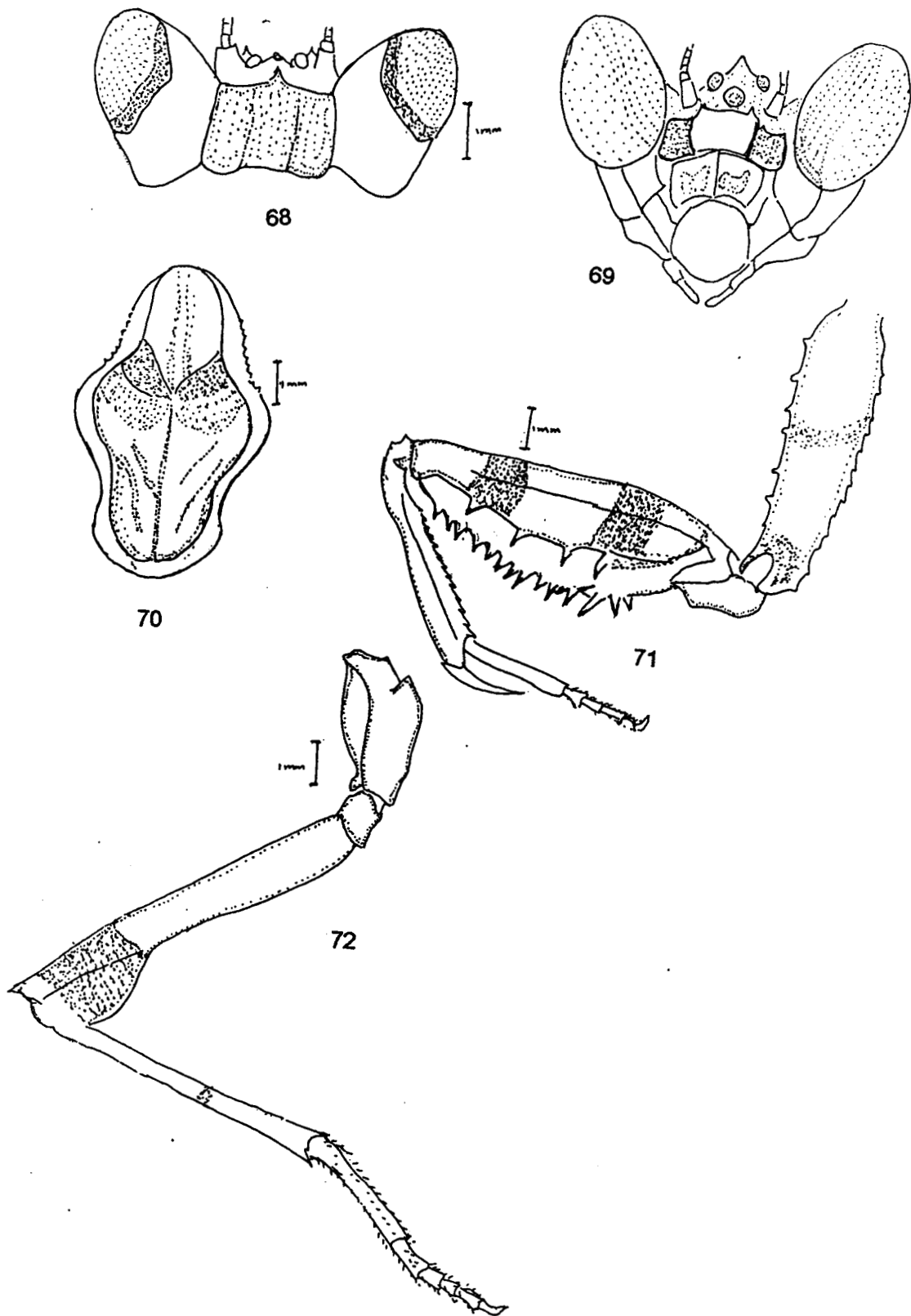
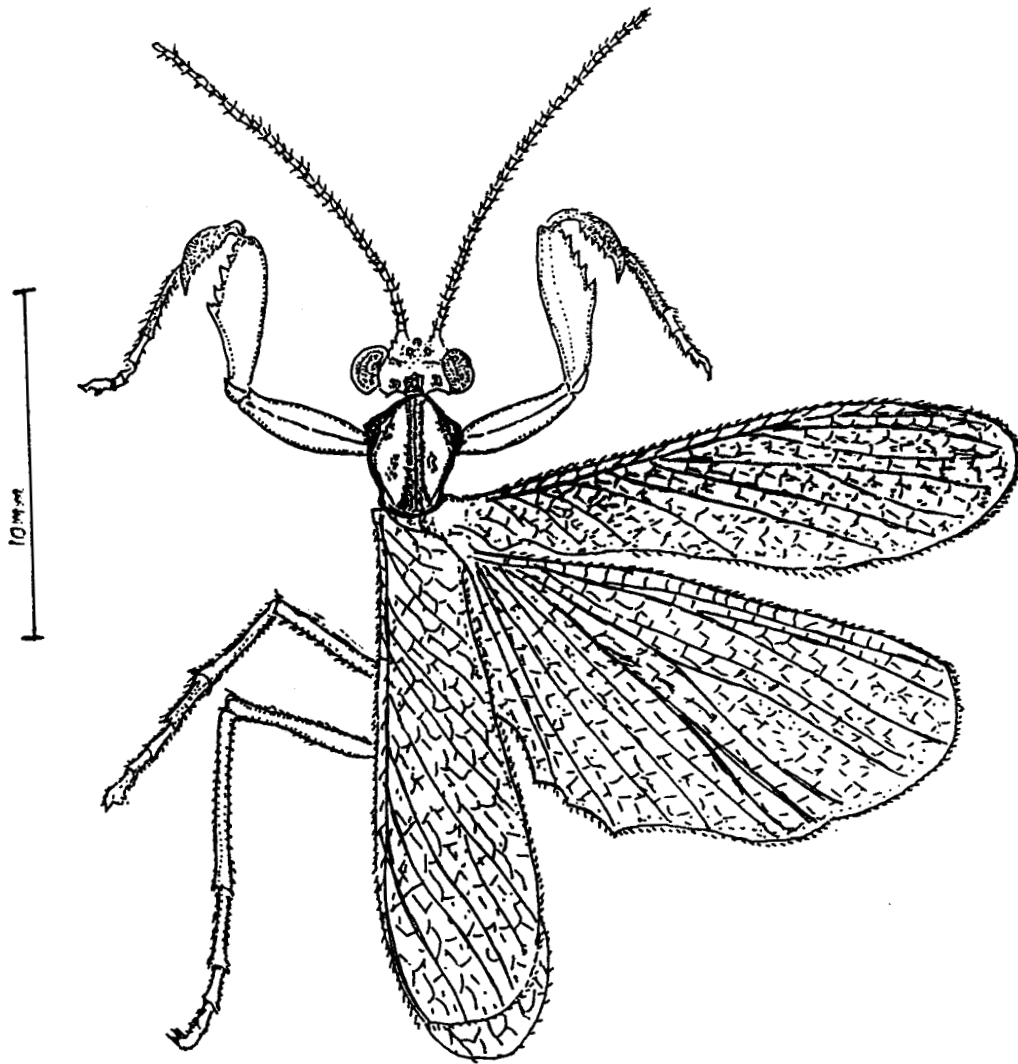


Fig.68-72 *Creobroter apicalis* Saussure

Fig.68. Head Dorsal view. Fig. 69.Head Ventral view Fig.70. Mesosoma

Fig.71.Foreleg. Fig. 72.Midleg.



73 *Amantis malabarensis* sp. nov.

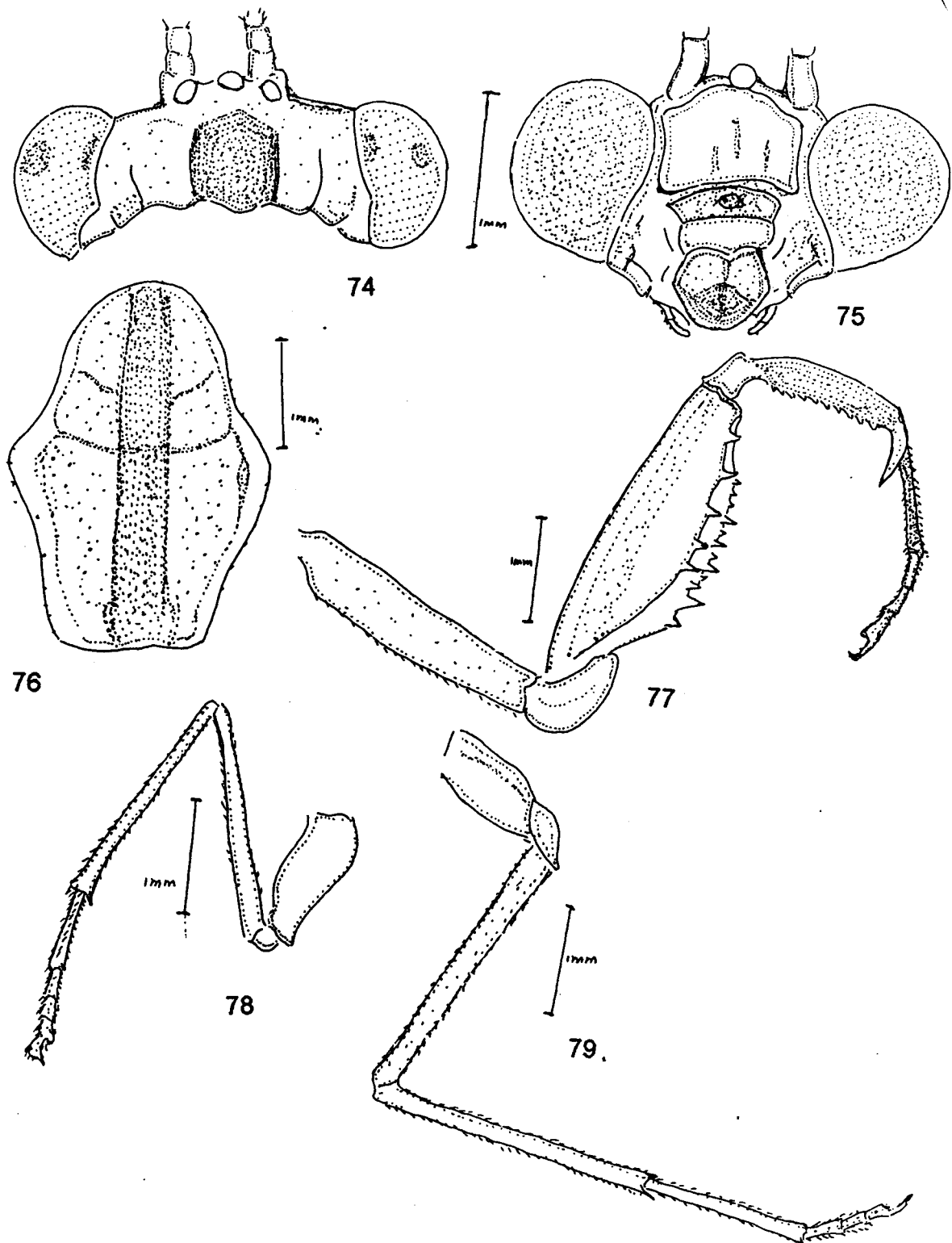
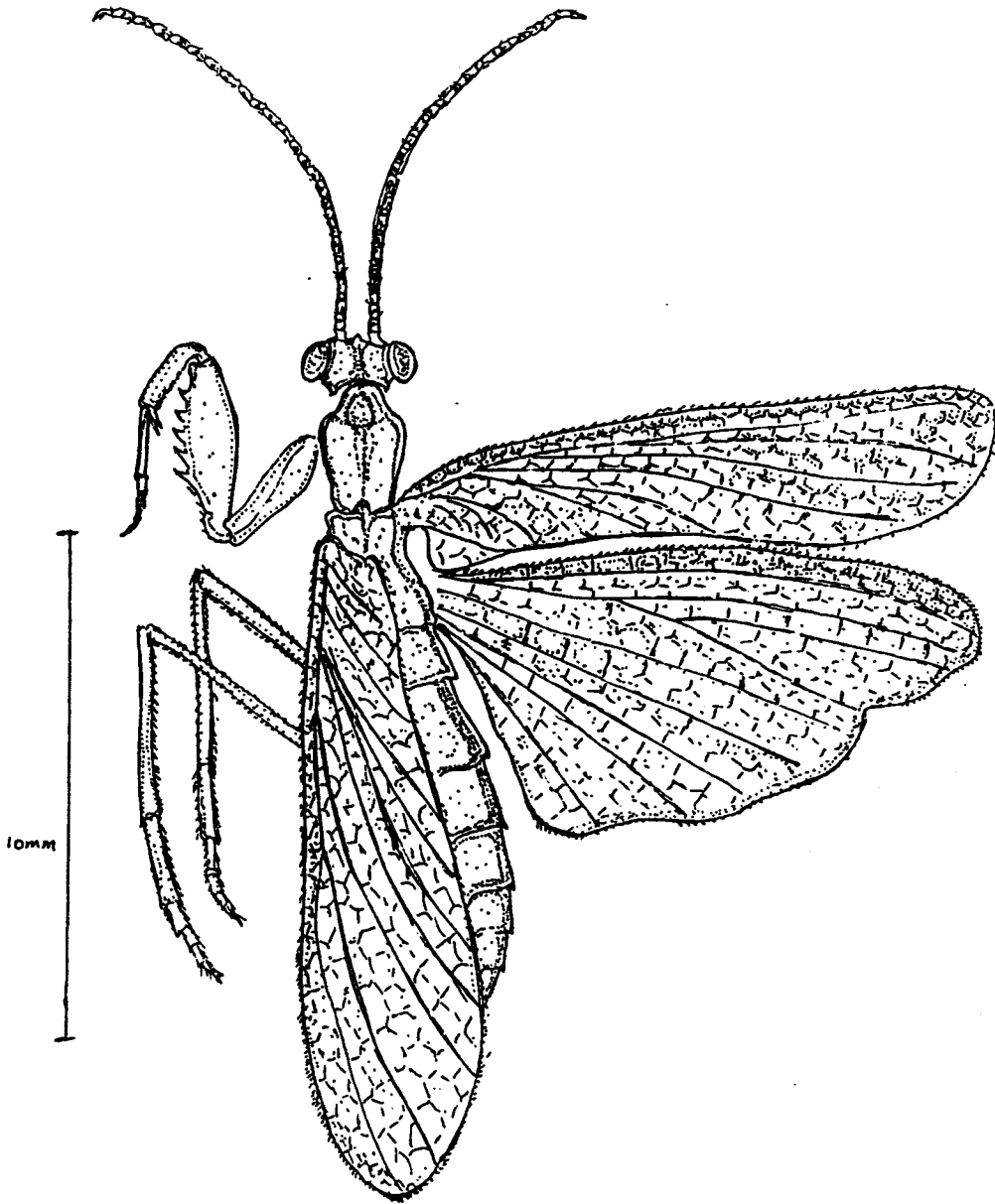


Fig.74-79 *Amantis malabarensis* sp. nov.

Fig.74. Head Dorsal view. Fig. 75. Head Ventral view Fig.76. Mesosoma

Fig.77. Foreleg. Fig. 78. Midleg. Fig.79 Hindleg



80 *Cimantis testacea* Werner

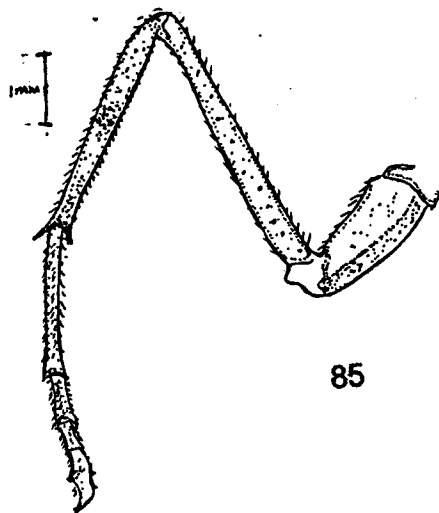
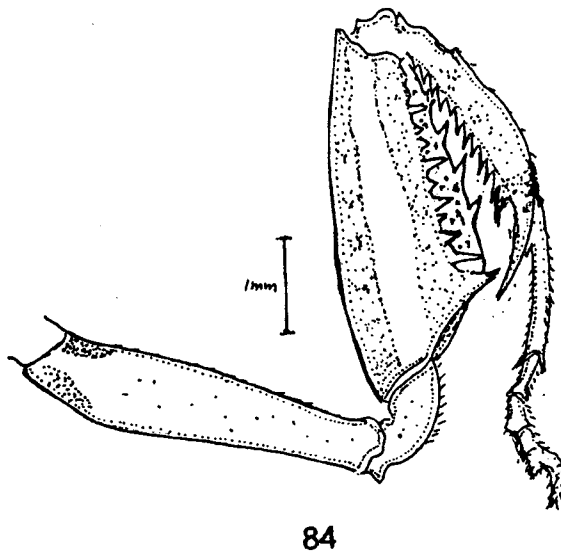
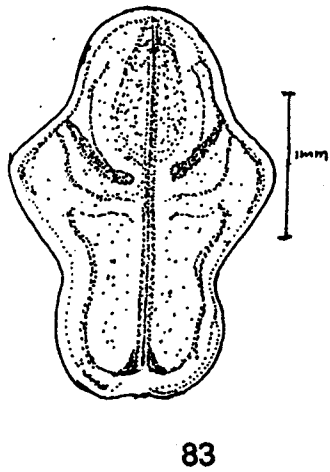
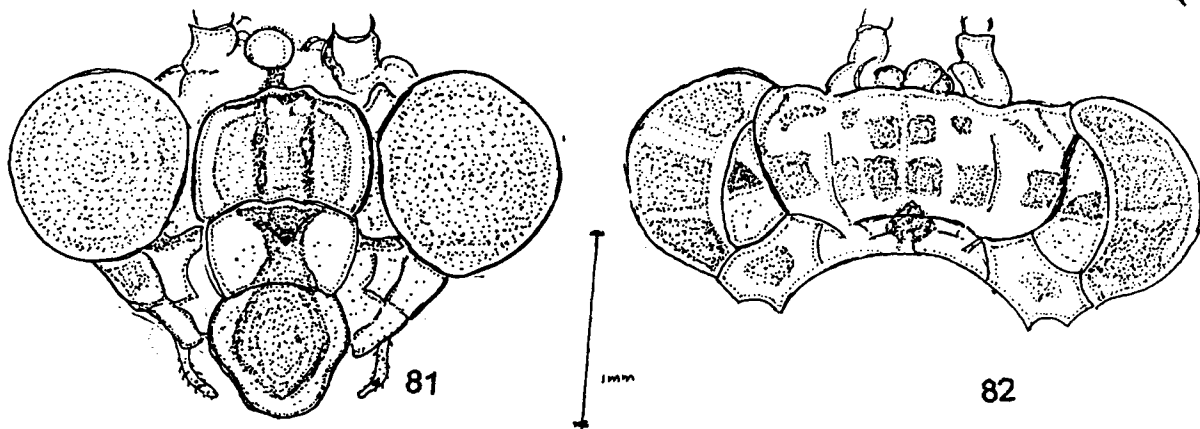
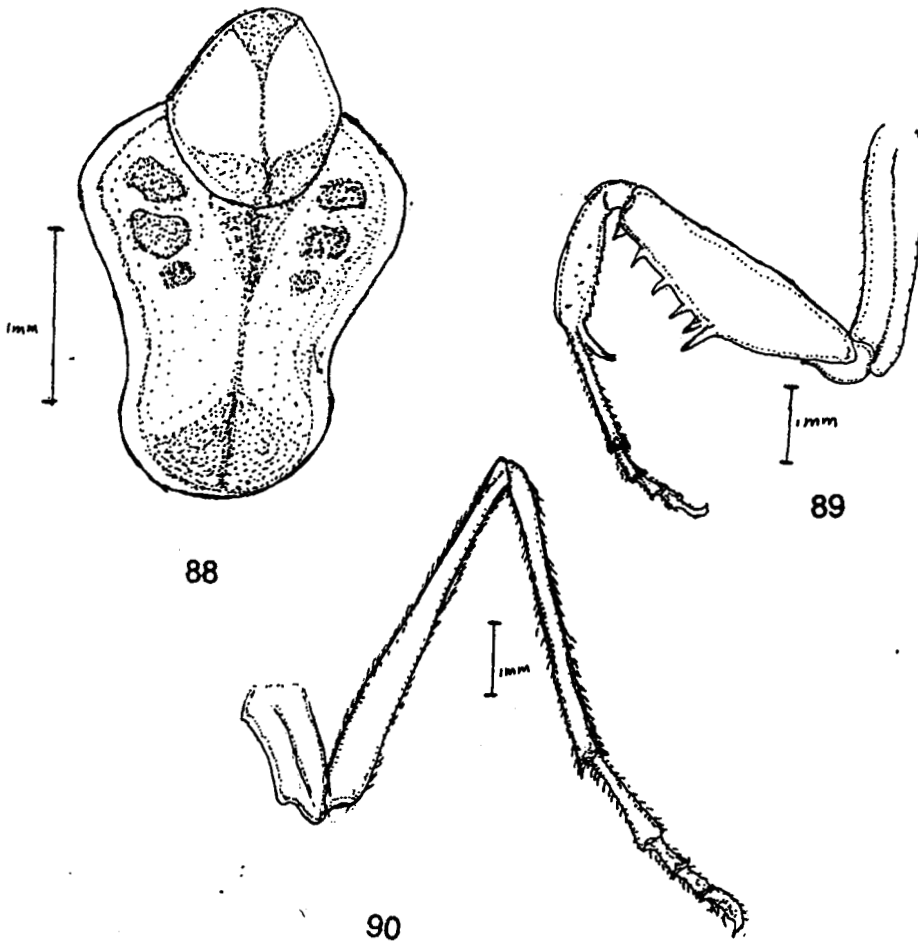
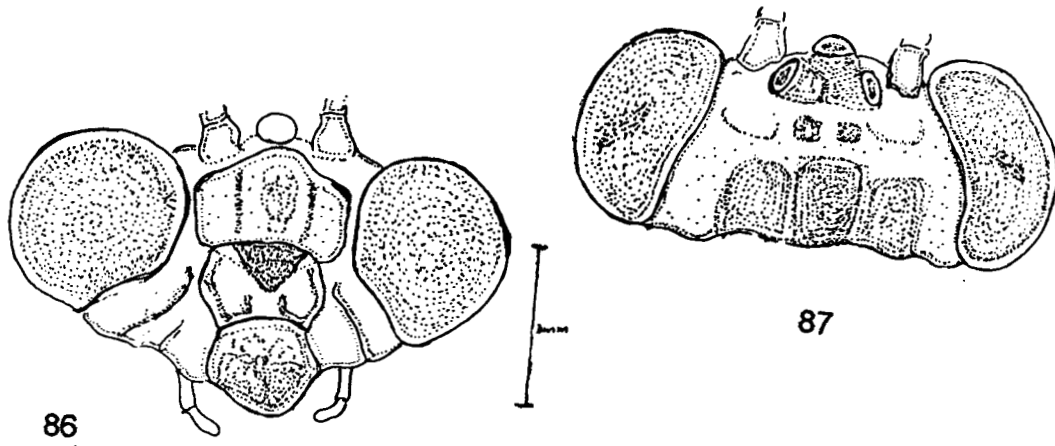


Fig.81-85 *Cimantis testacea* Werner

Fig.81. Head Ventral view. Fig. 82.Head Dorsal view Fig.83. Mesosoma

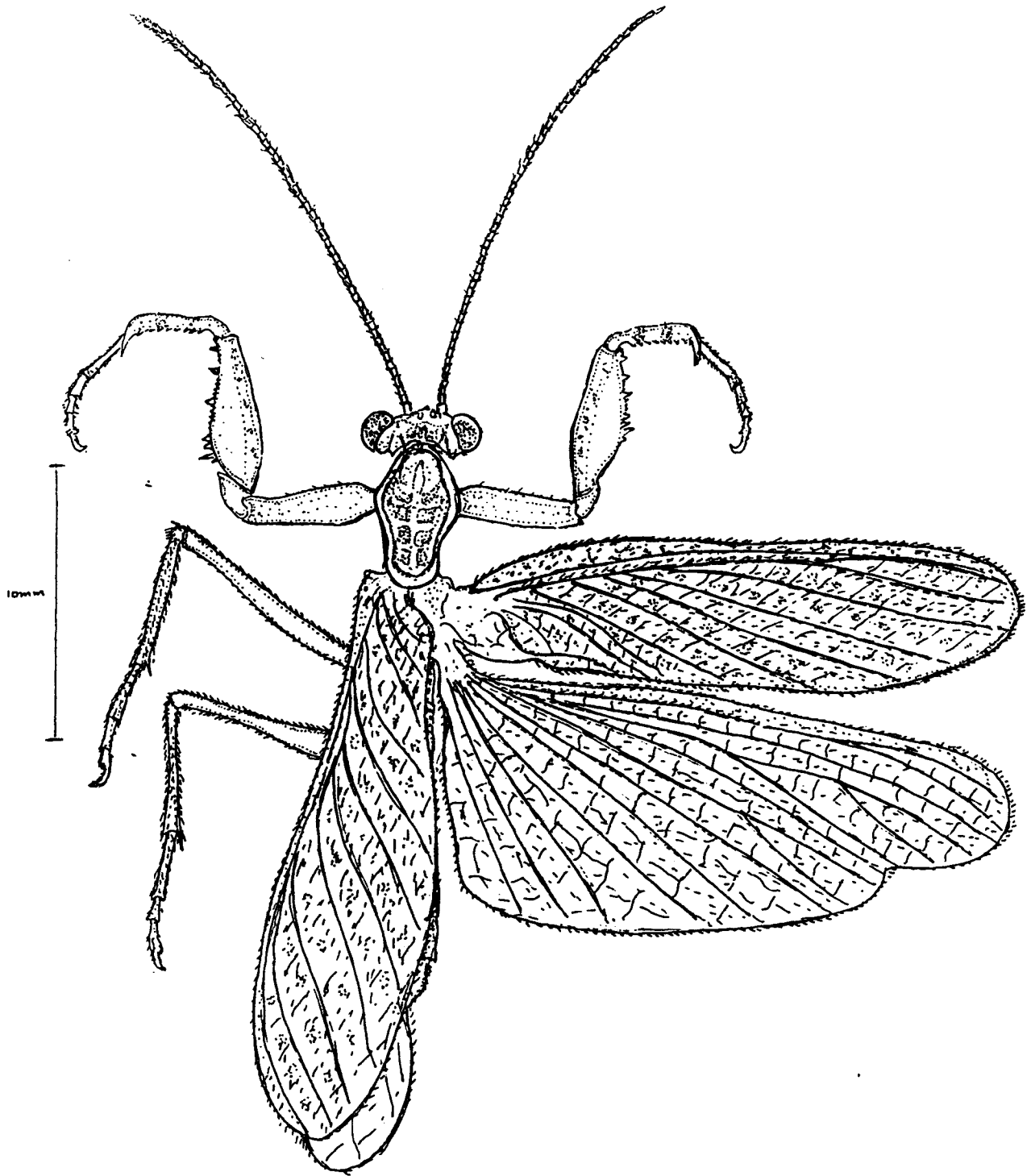
Fig.84.Foreleg. Fig. 85.Midleg



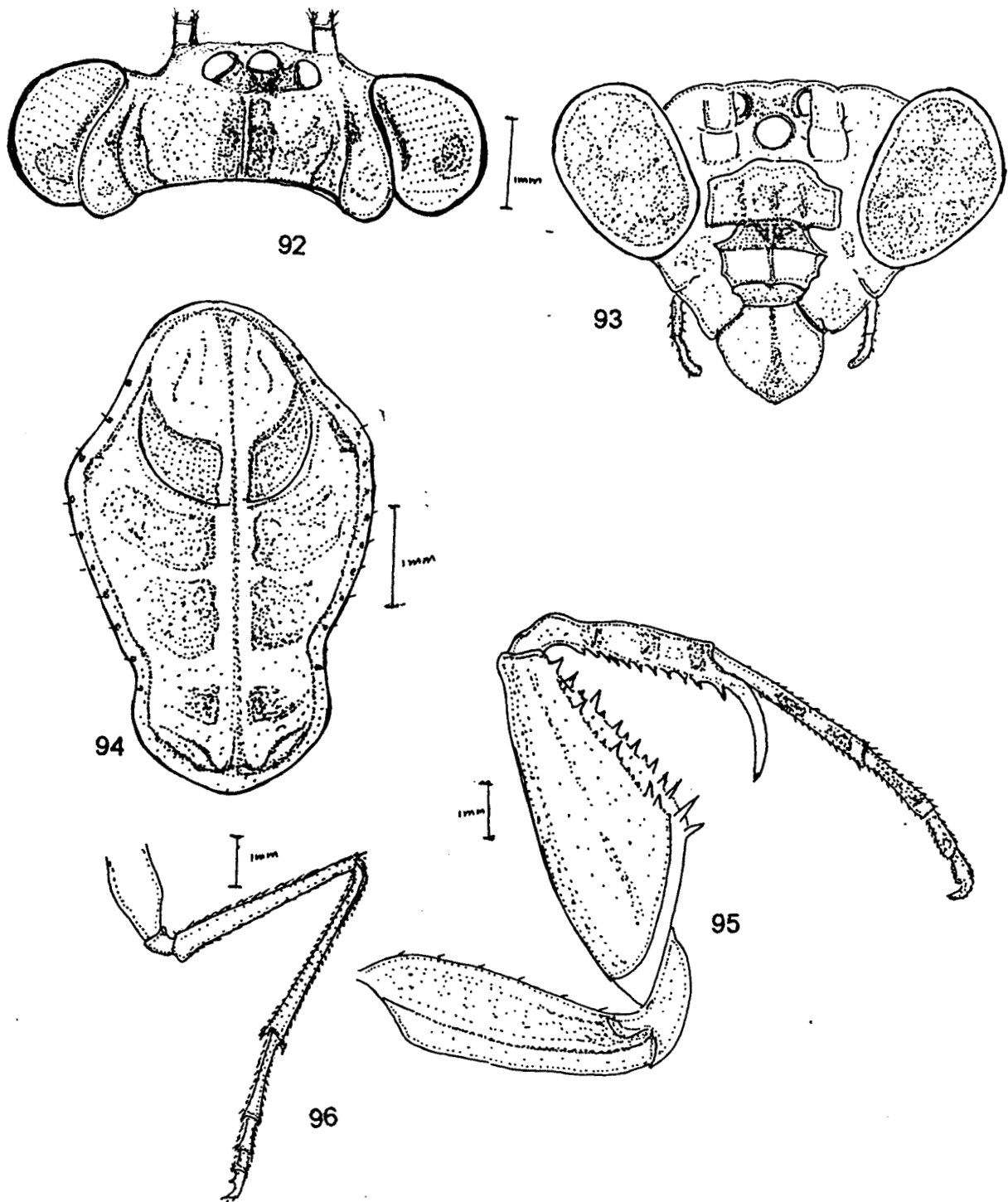
Figs. 86-90 . *Cimantis fulginosa* Werner

Fig.86. Head Ventral view. Fig. 87.Head Dorsal view Fig.88. Mesosoma

Fig.89.Foreleg. Fig. 90.Hindleg



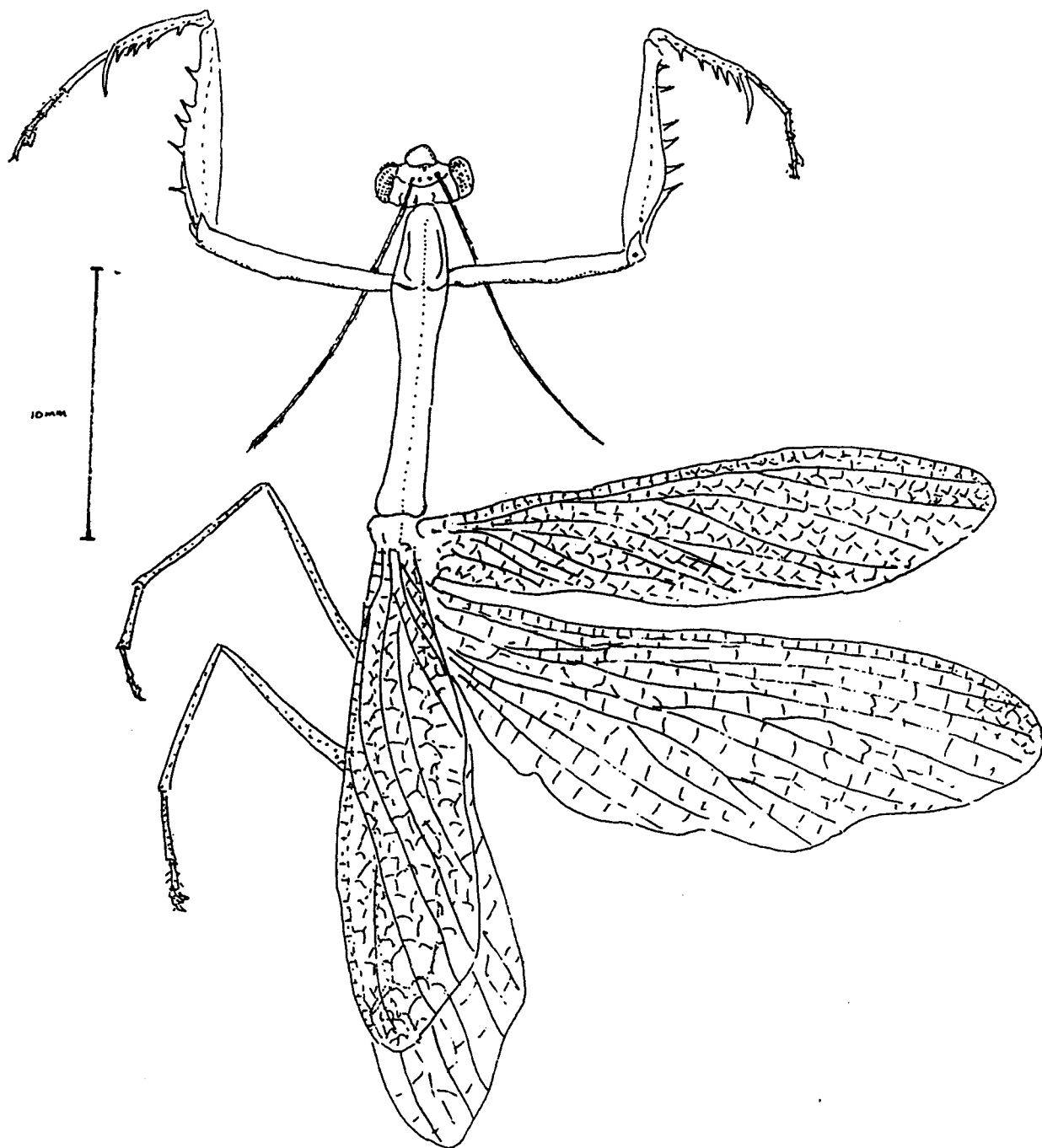
91 *Elmantis trincomaliae* (Saussure)



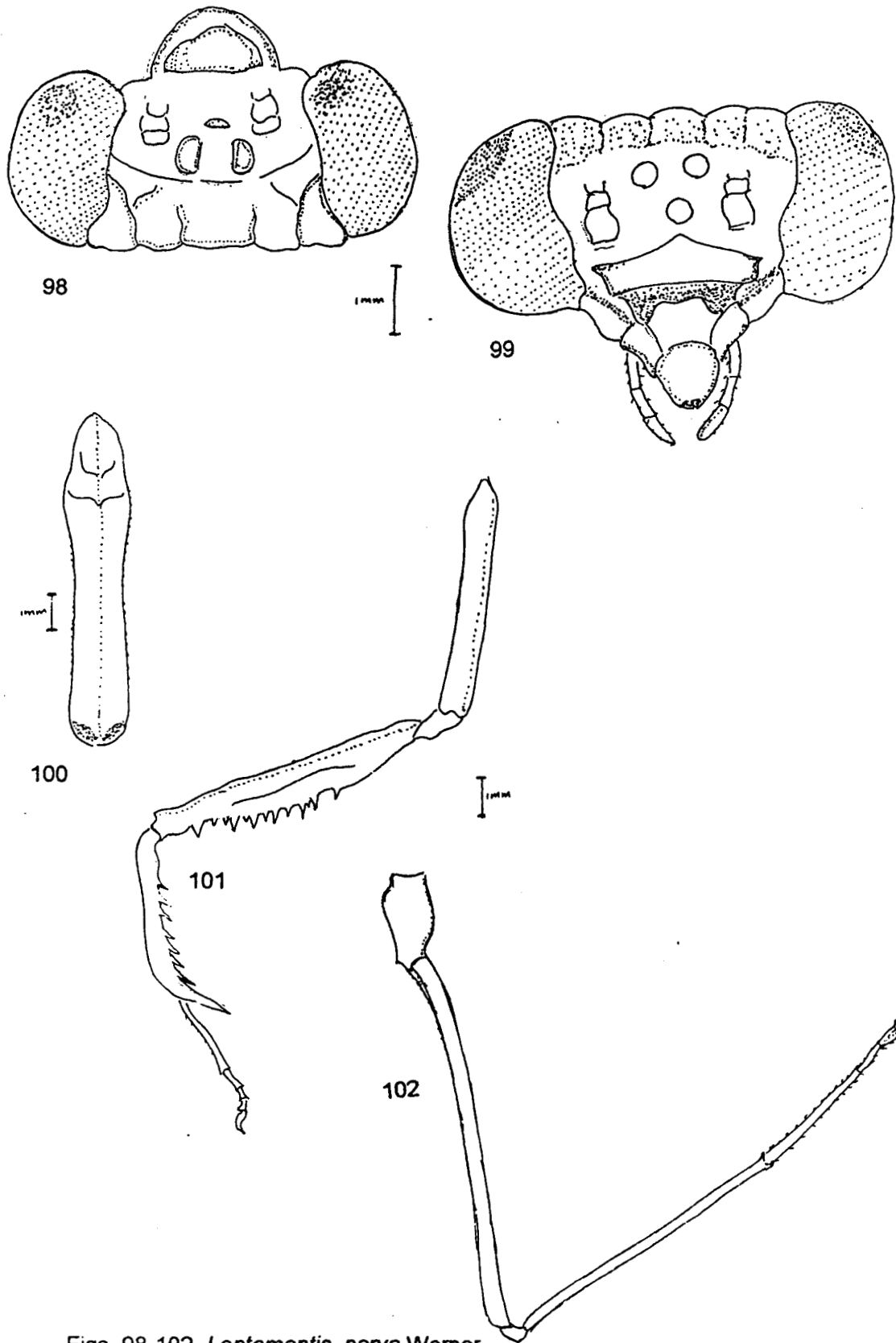
Figs. 92-96 *Elmantis trincomaliae* (Saussure)

Fig.92. Head Dorsal view. Fig. 93.Head Ventral view Fig.94. Mesosoma

Fig.95.Foreleg. Fig. 96.Midleg



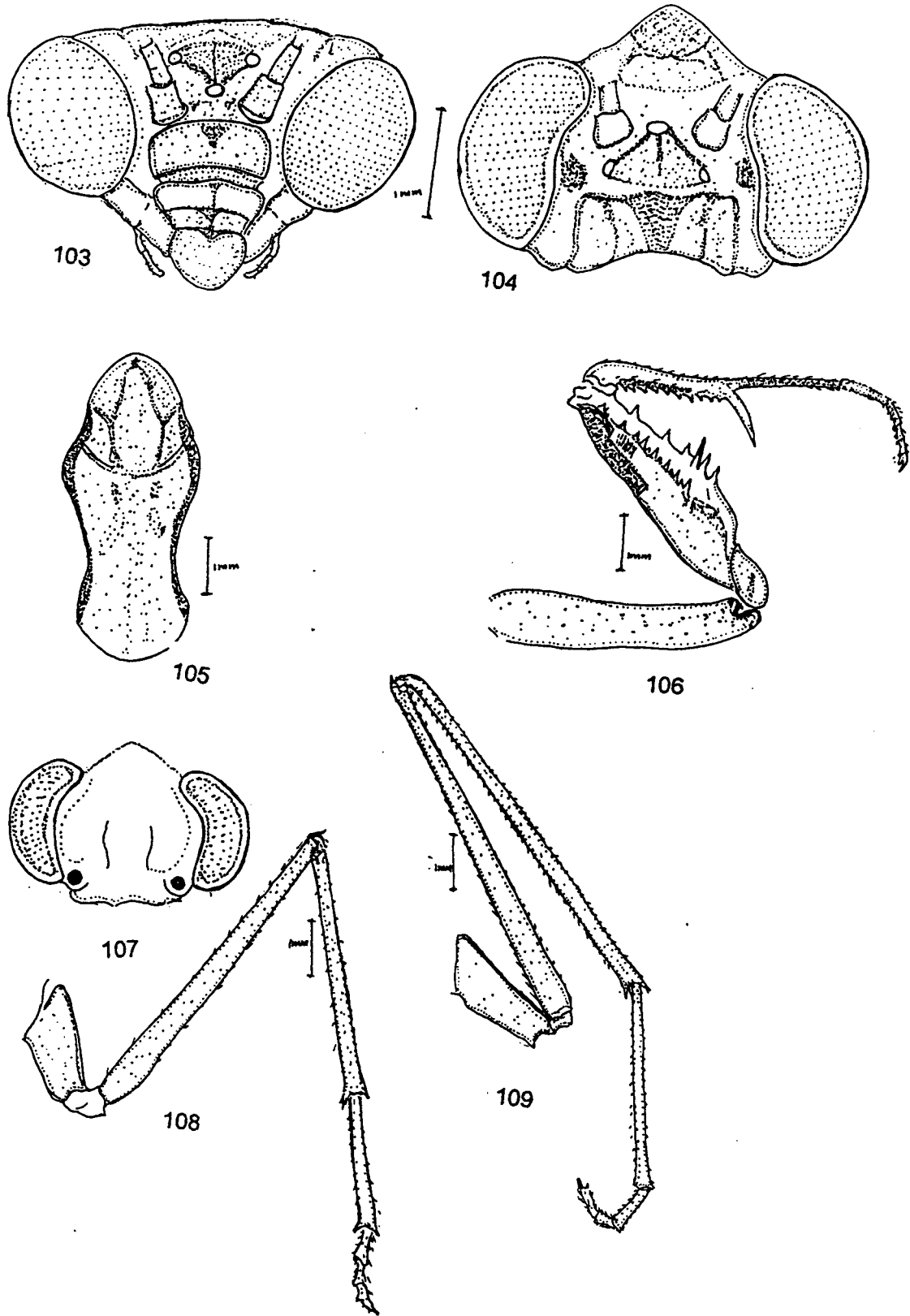
97 *Leptomantis parva* Werner



Figs. 98-102. *Leptomantis parva* Werner

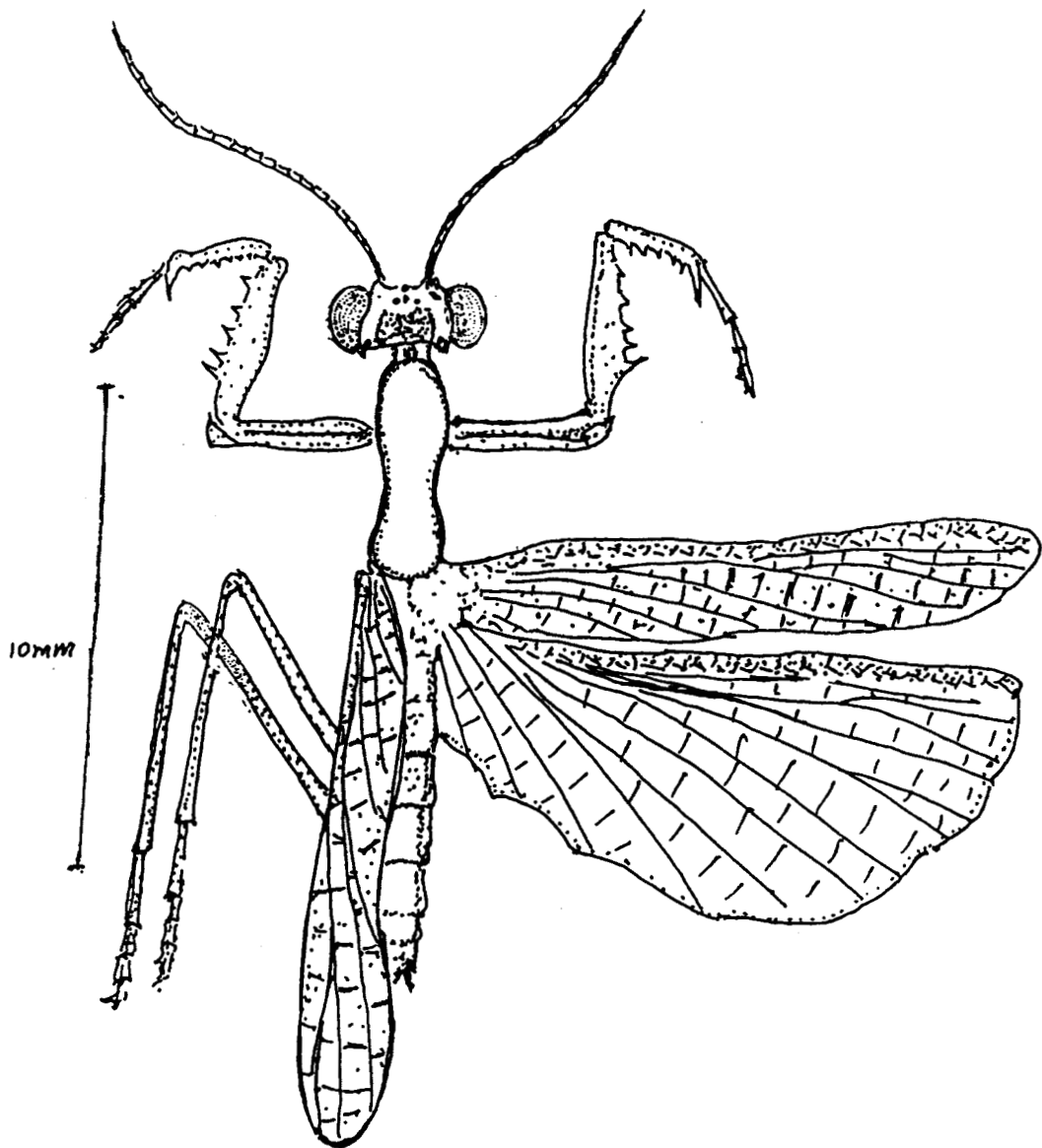
Fig.98. Head Dorsal view. Fig.99. Head Ventral view Fig.100. Mesosoma

Fig.101. Foreleg. Fig. 102. Hindleg

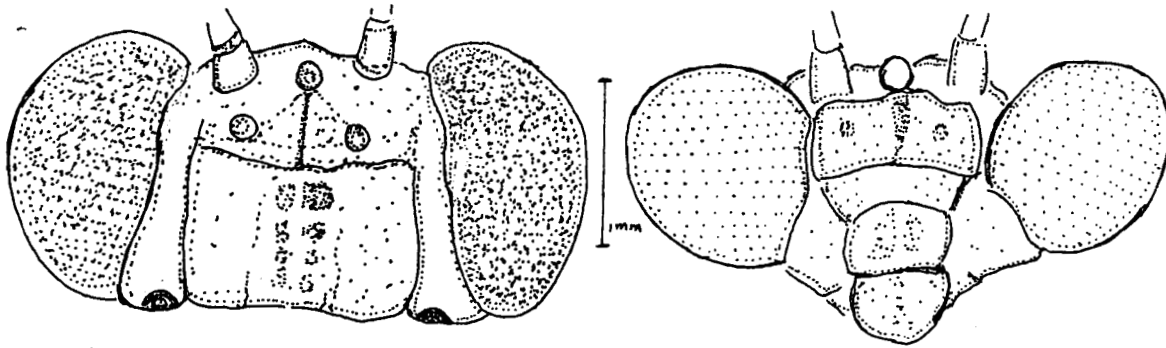


Figs. 103-109. *Hapalopeza periyara* Mukherjee & Hazra

Fig.103. Head Ventral view. Fig. 104. Head Dorsal view Fig.105. Mesosoma
 Fig.106. Foreleg. Fig.107. Head inner view .Fig.108. Midleg. Fig .109. Hindleg

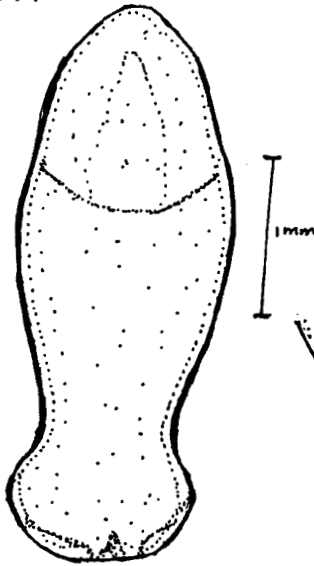


110 *Hapalopeza trissurensis* sp. nov.

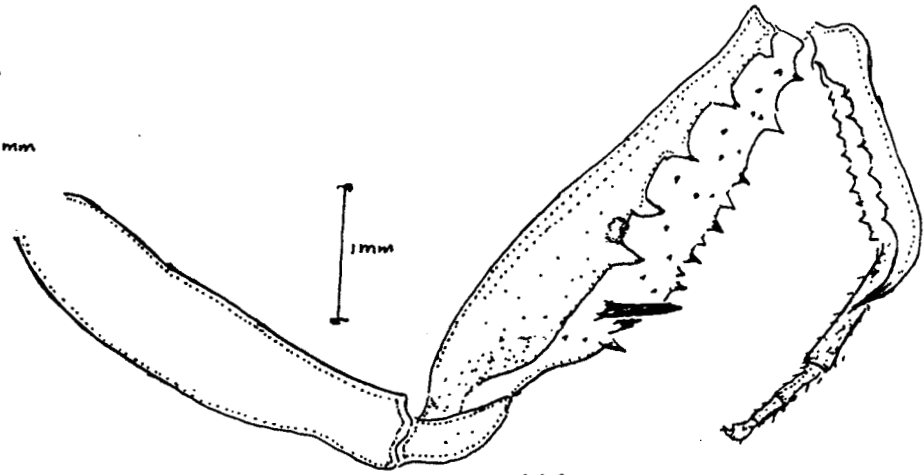


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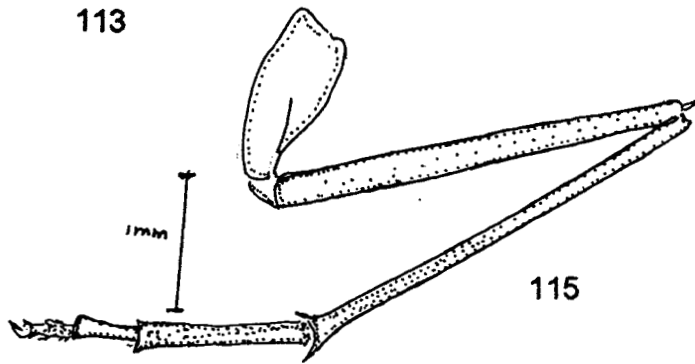
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113



114



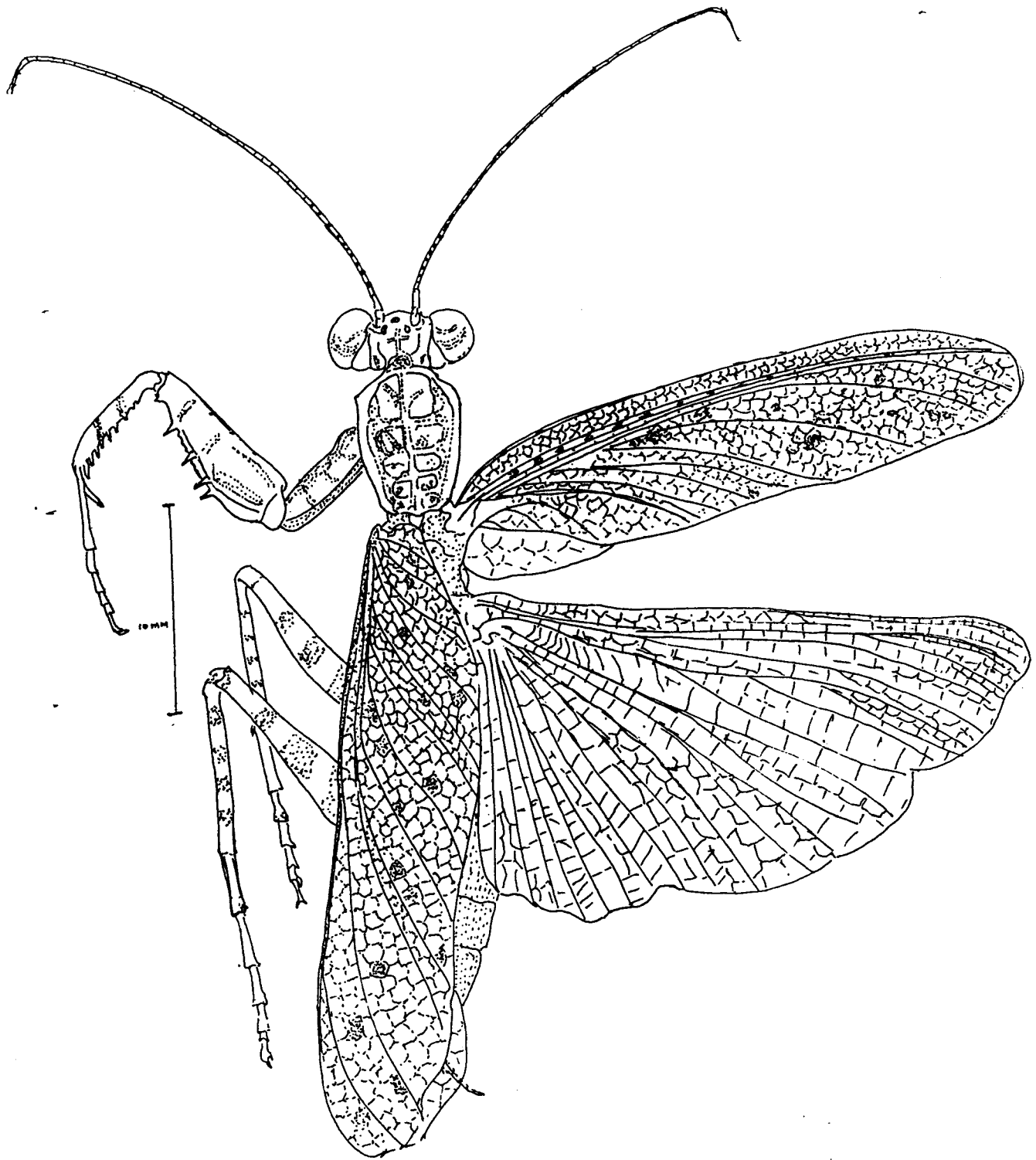
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Figs. 111-115. *Hapalopeza trissurensis* sp. nov.

Fig.111. Head Dorsal view. Fig.112. Head Ventral view Fig.113. Mesosoma

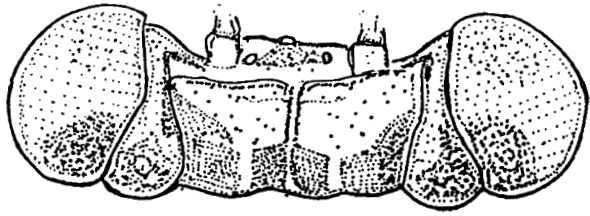
Fig.114. Foreleg. Fig. 115. Hindleg

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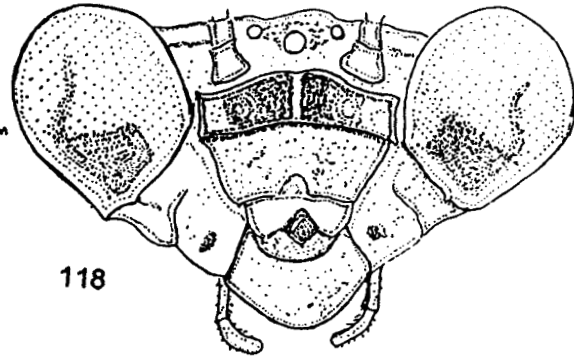


116 *Humbertiella similis* Giglio-Tos

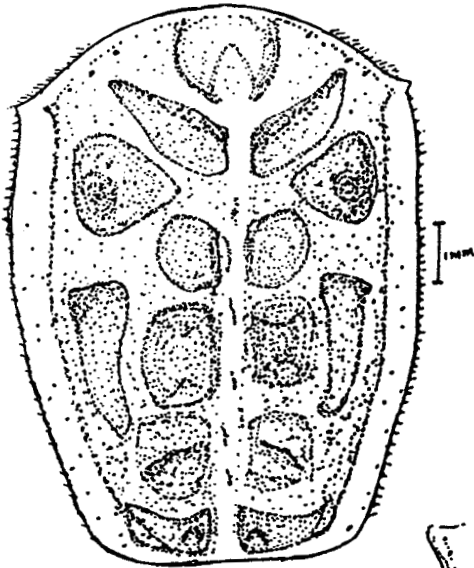
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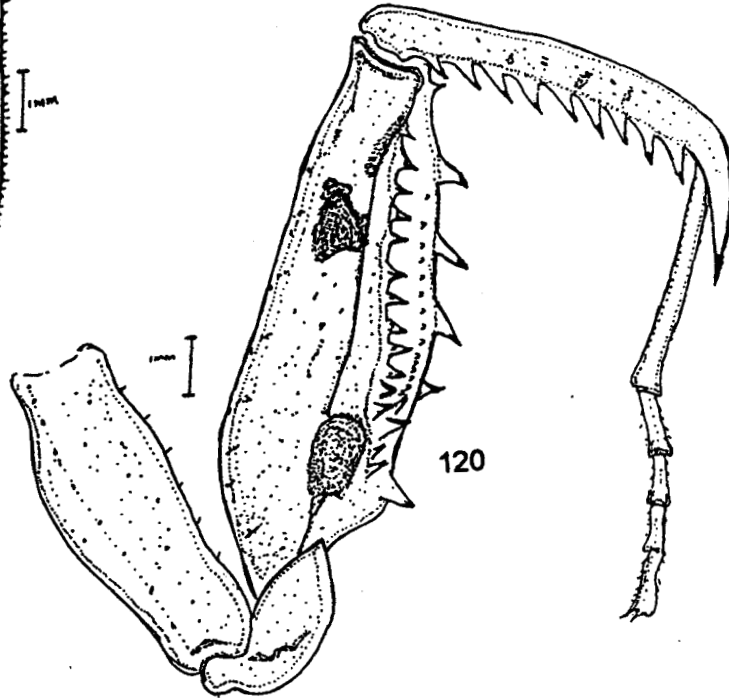
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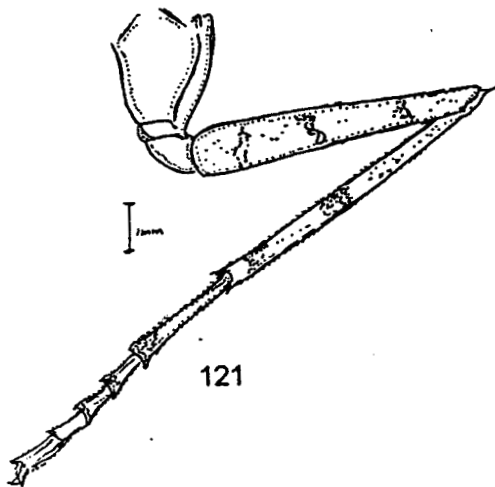
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120



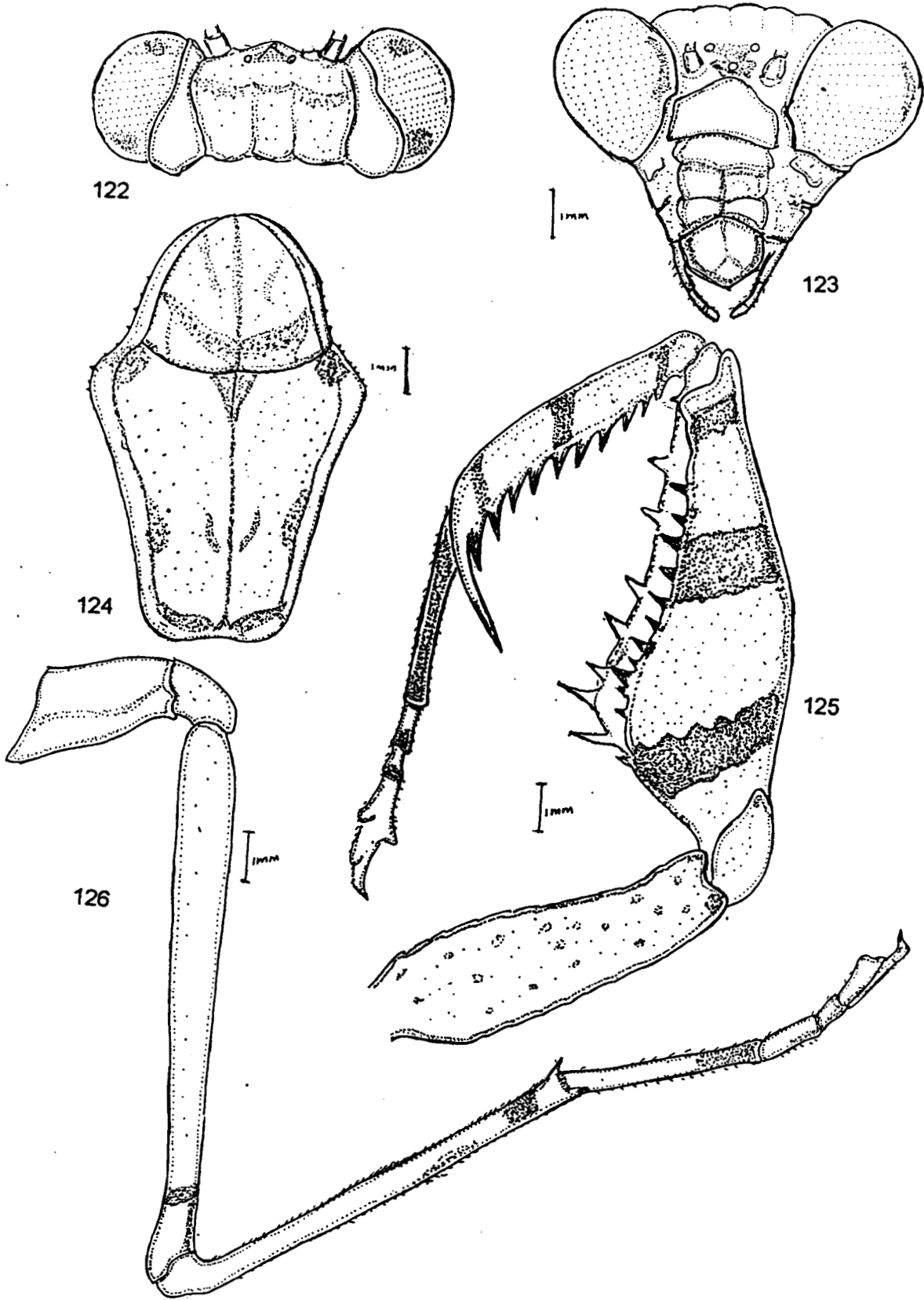
121

Figs. 117-121. *Humbertiella affinis* Giglio -Tos

Fig. 117. Head Dorsal view. Fig. 118. Head Ventral view Fig. 119. Mesosoma

Fig. 120. Foreleg. Fig. 121. Midleg

129

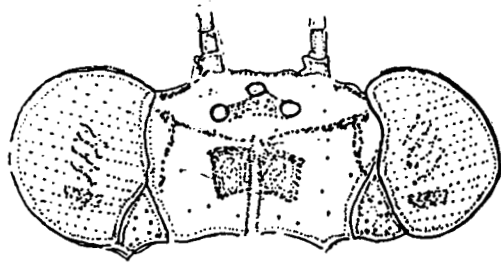


Figs. 122-126. *Humbertiella ceylonica* Saussure

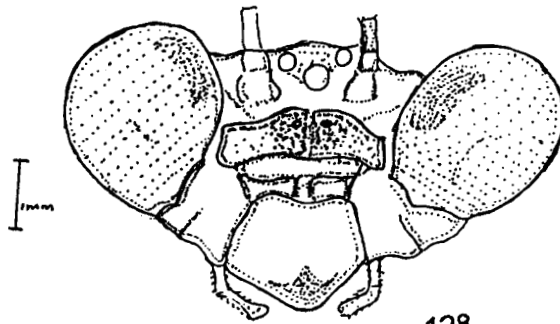
Fig. 122. Head Dorsal view. Fig. 123. Head Ventral view Fig. 124. Mesosoma

Fig. 125. Foreleg. Fig. 126. Midleg

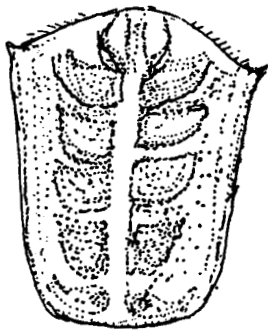
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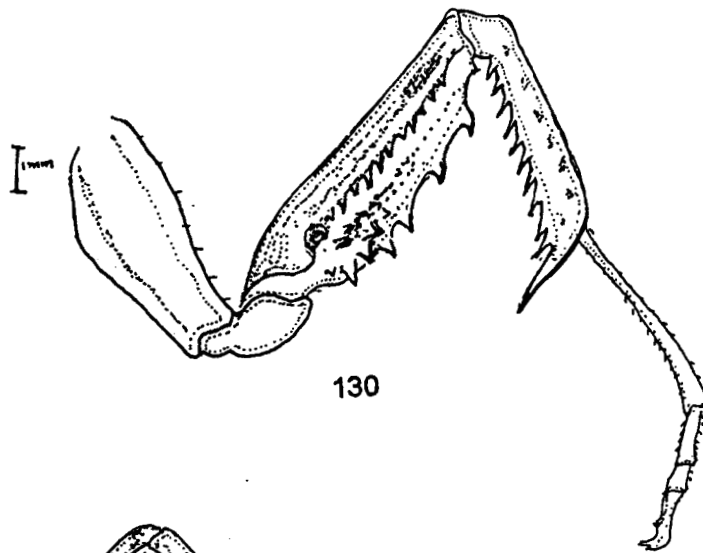
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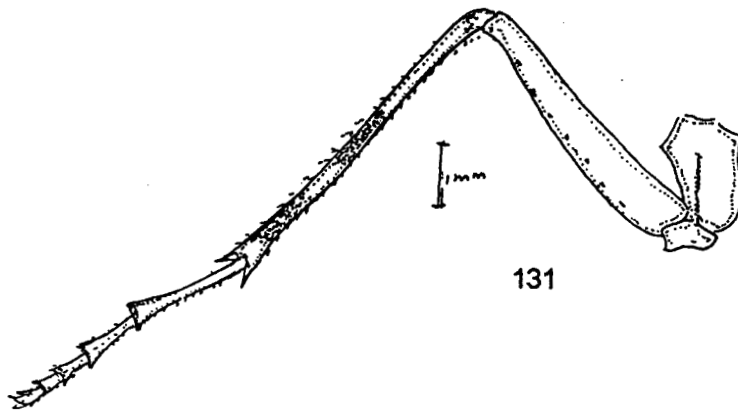
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130



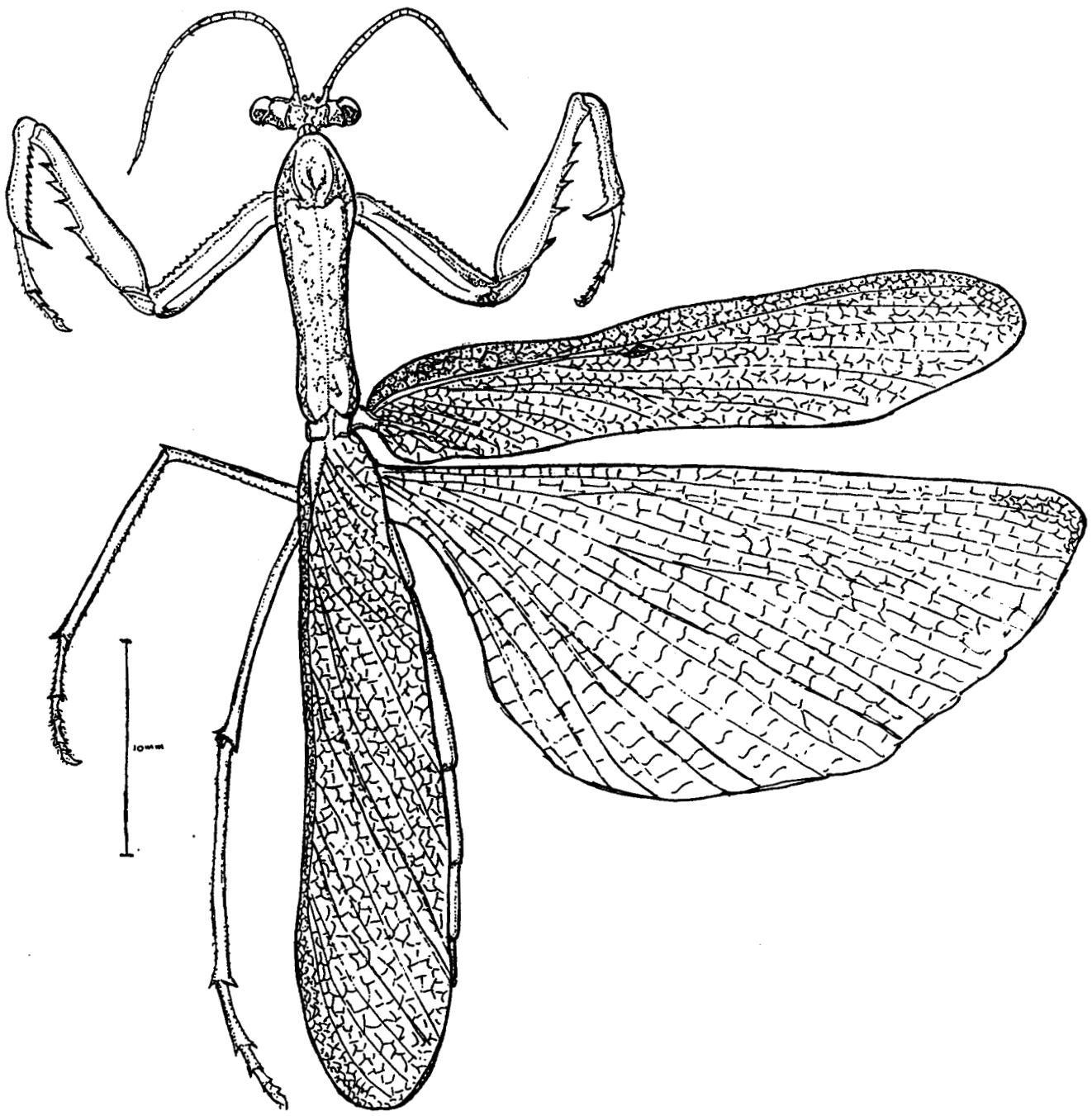
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Figs. 127-131. *Humbertiella similis* Giglio -Tos

Fig. 127. Head Dorsal view. Fig. 128. Head Ventral view Fig. 129. Mesosoma

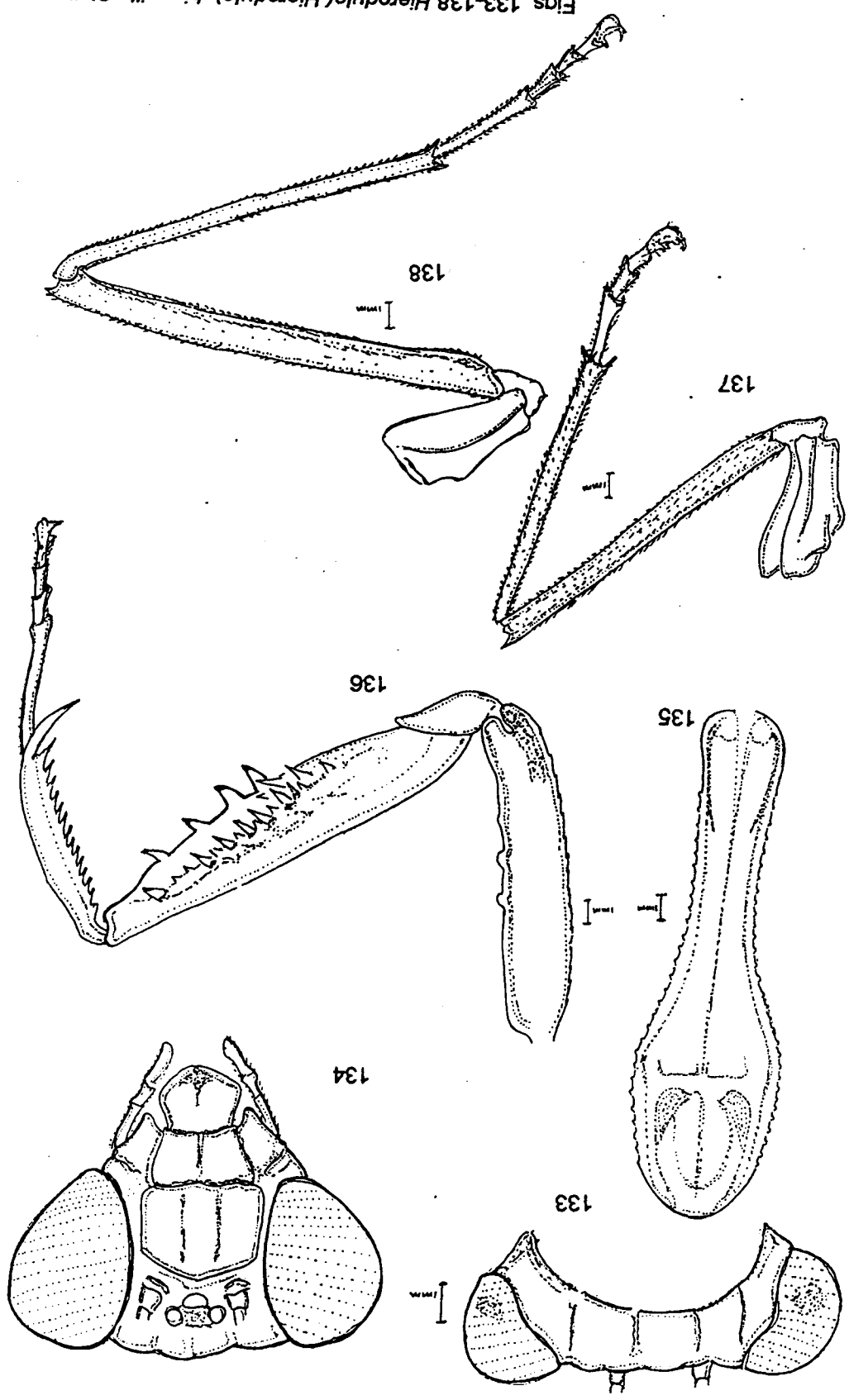
Fig. 130. Foreleg. Fig. 131. Hindleg

750



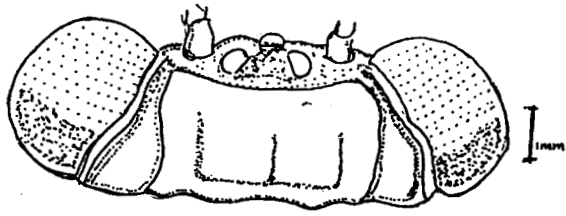
132 *Hierodula(Hierodula) membraniacea* (Burmeister)

75

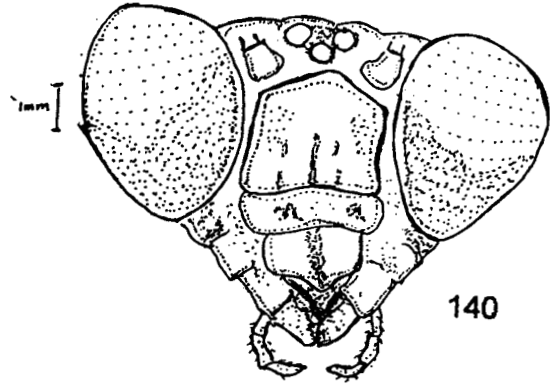


Figs. 133-138. *Hierodula (Hierodula) bipapilla* Giglio-Tos

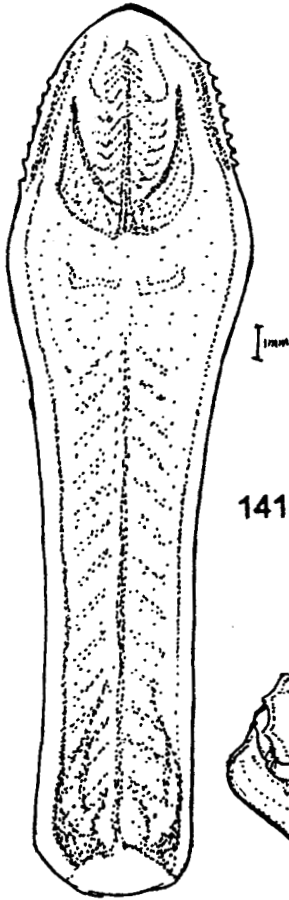
Fig. 133. Head Dorsal view. Fig. 134. Head Ventral view Fig. 135. Mesosoma Fig. 136. Foreleg. Fig. 137. Midleg Fig. 138. Hindleg



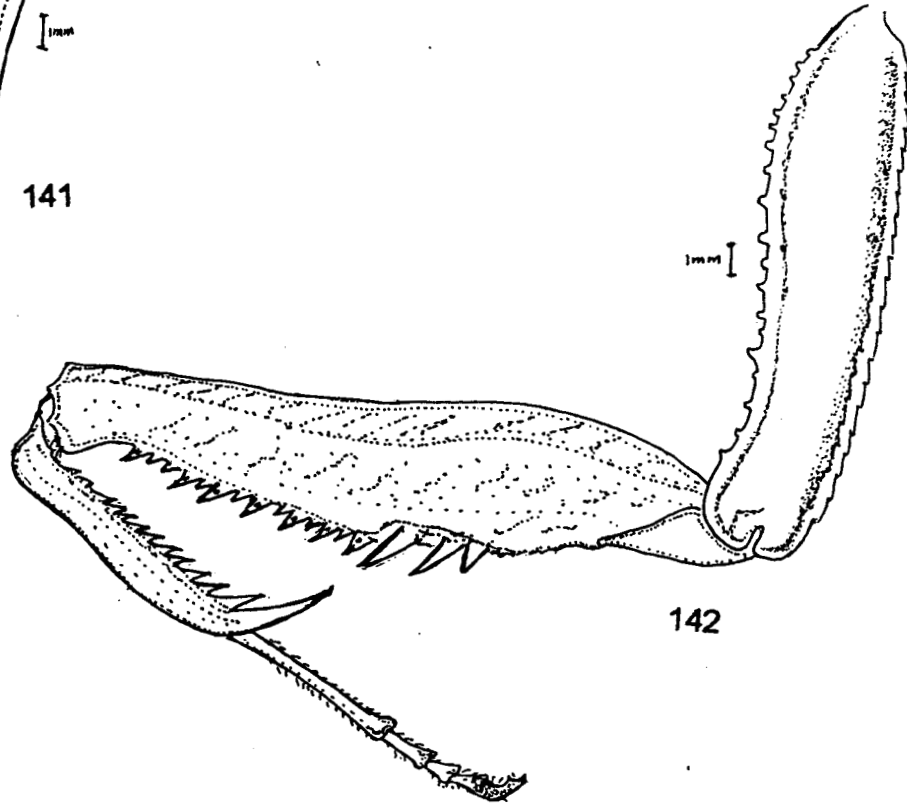
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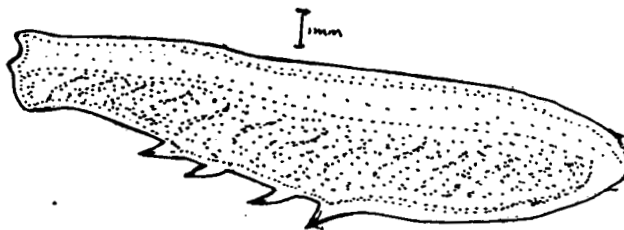
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143

Figs. 139-145. *Hierodula (Hierodula) keralensis* sp. nov.

Fig. 139. Head Dorsal view. Fig. 140. Head Ventral view Fig. 141. Mesosoma

Fig. 142. Foreleg. Fig. 143. Forefemur external view

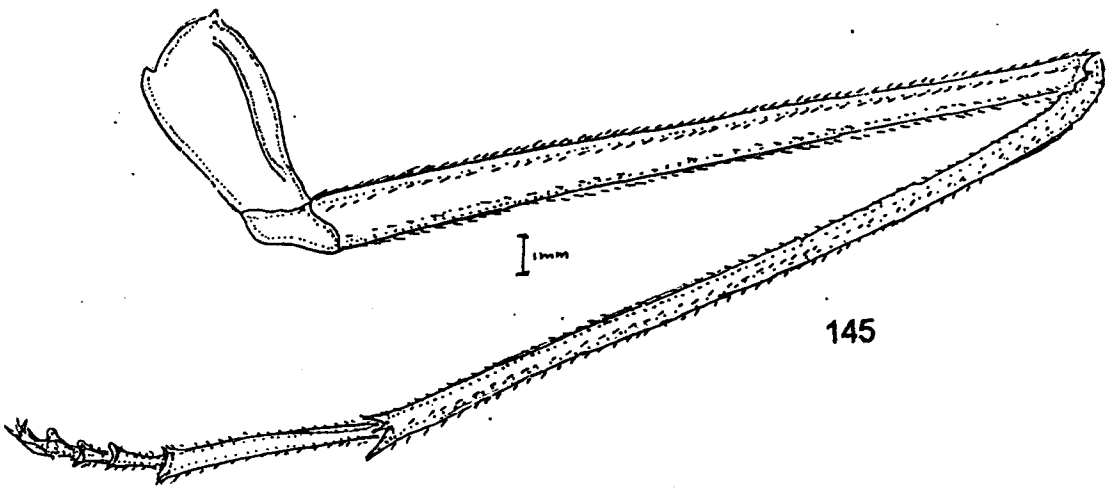
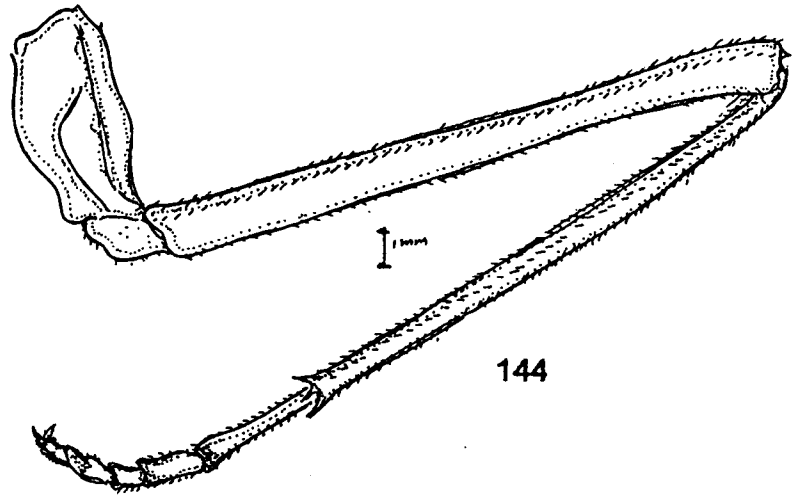
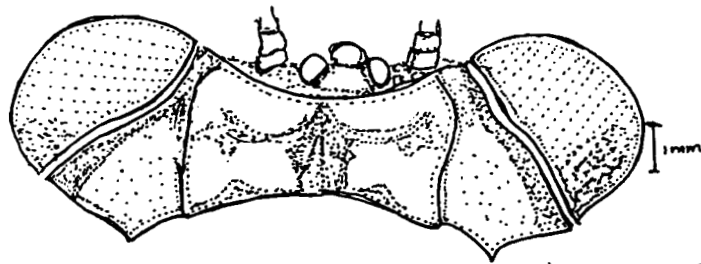
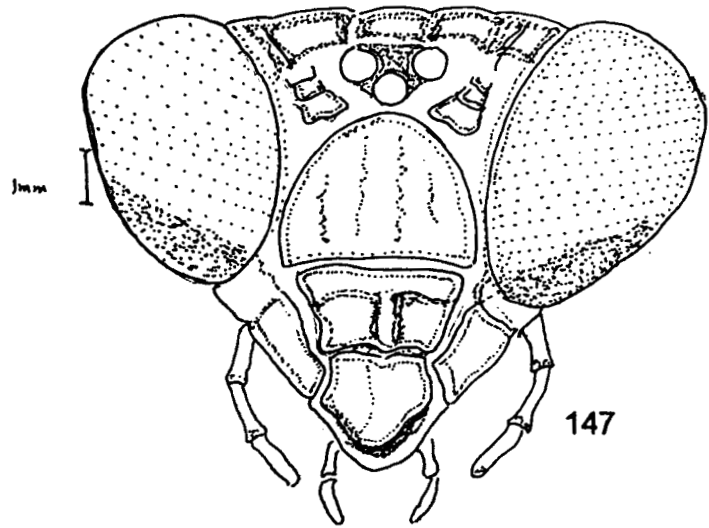


Fig.144 Midleg

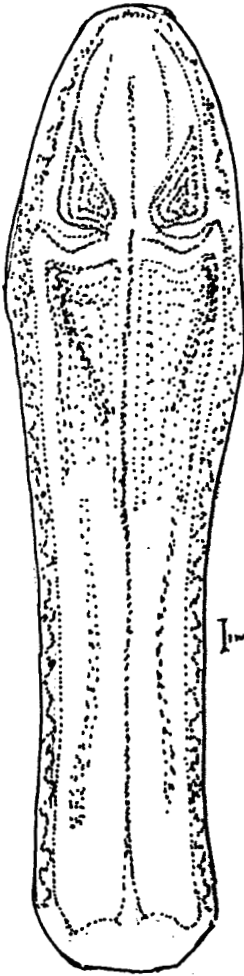
Fig.145.Hindleg



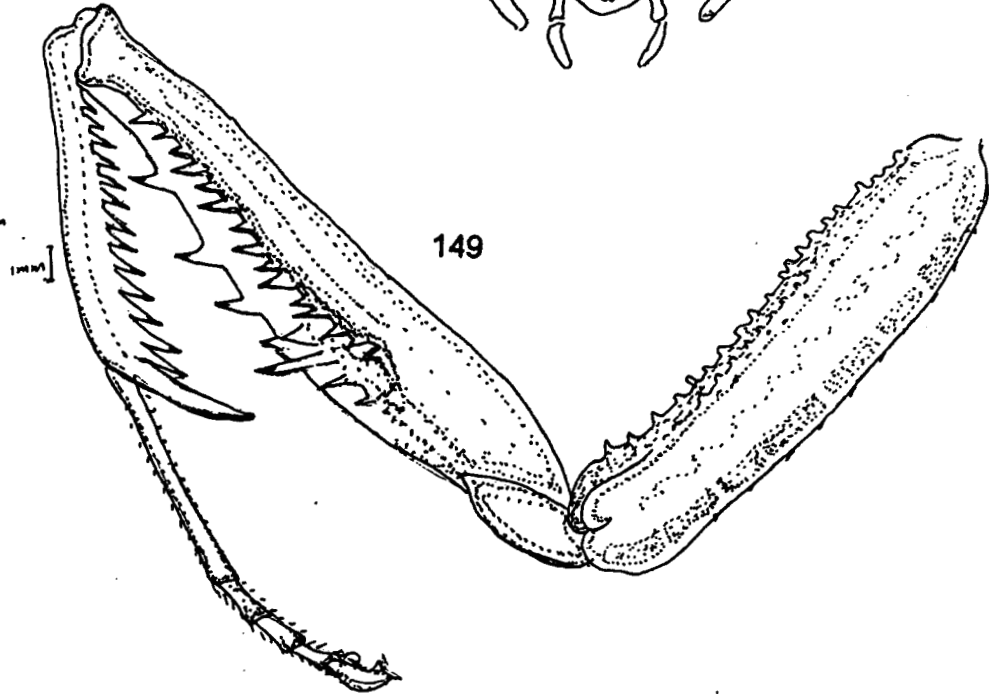
146



147



148



149

Figs. 146-150. *Hierodula* (*Hierodula*) *membranacea* (Burmeister)

Fig. 146. Head Dorsal view. Fig. 147. Head Ventral view Fig. 148. Mesosoma

Fig. 149. Foreleg.

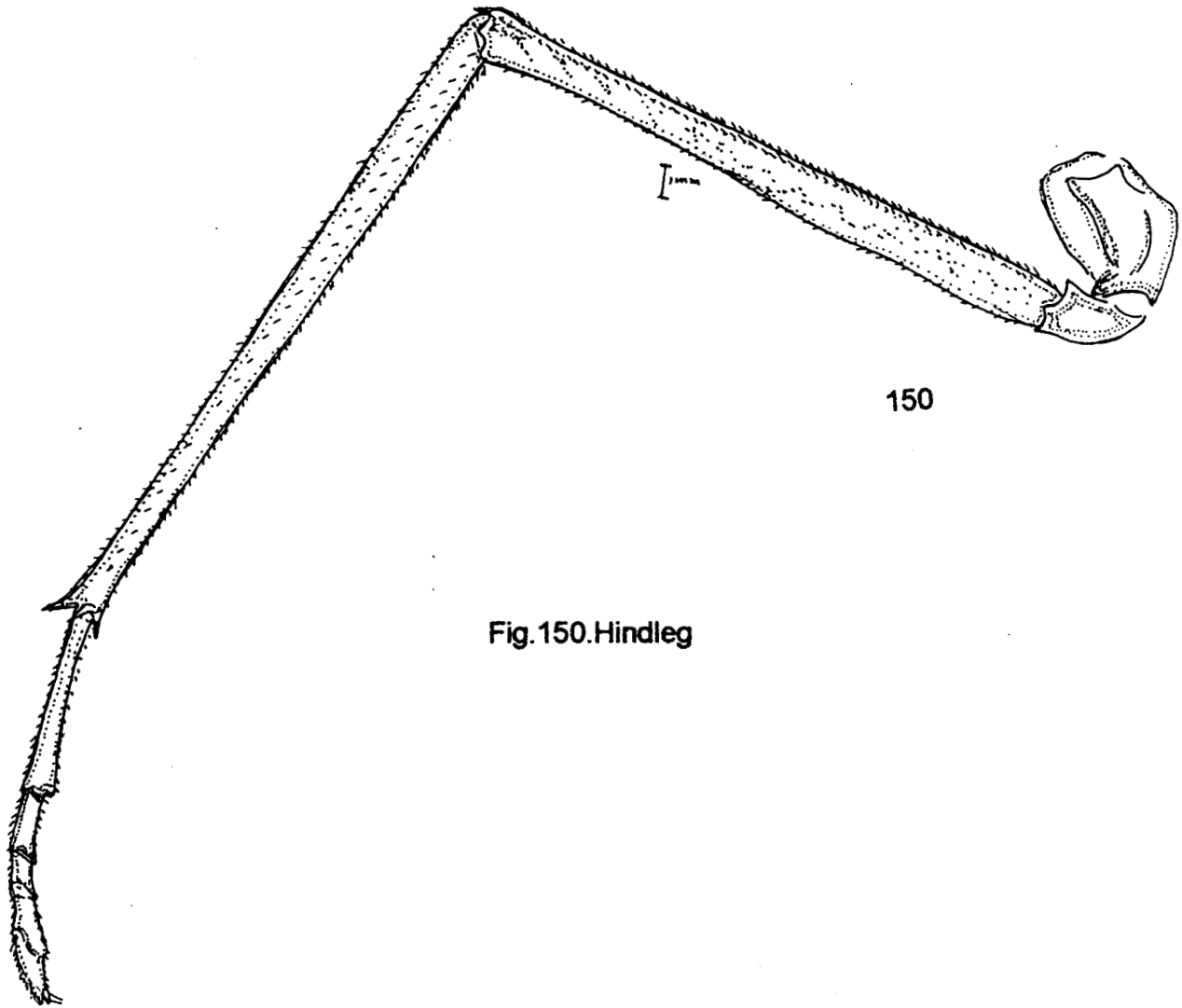
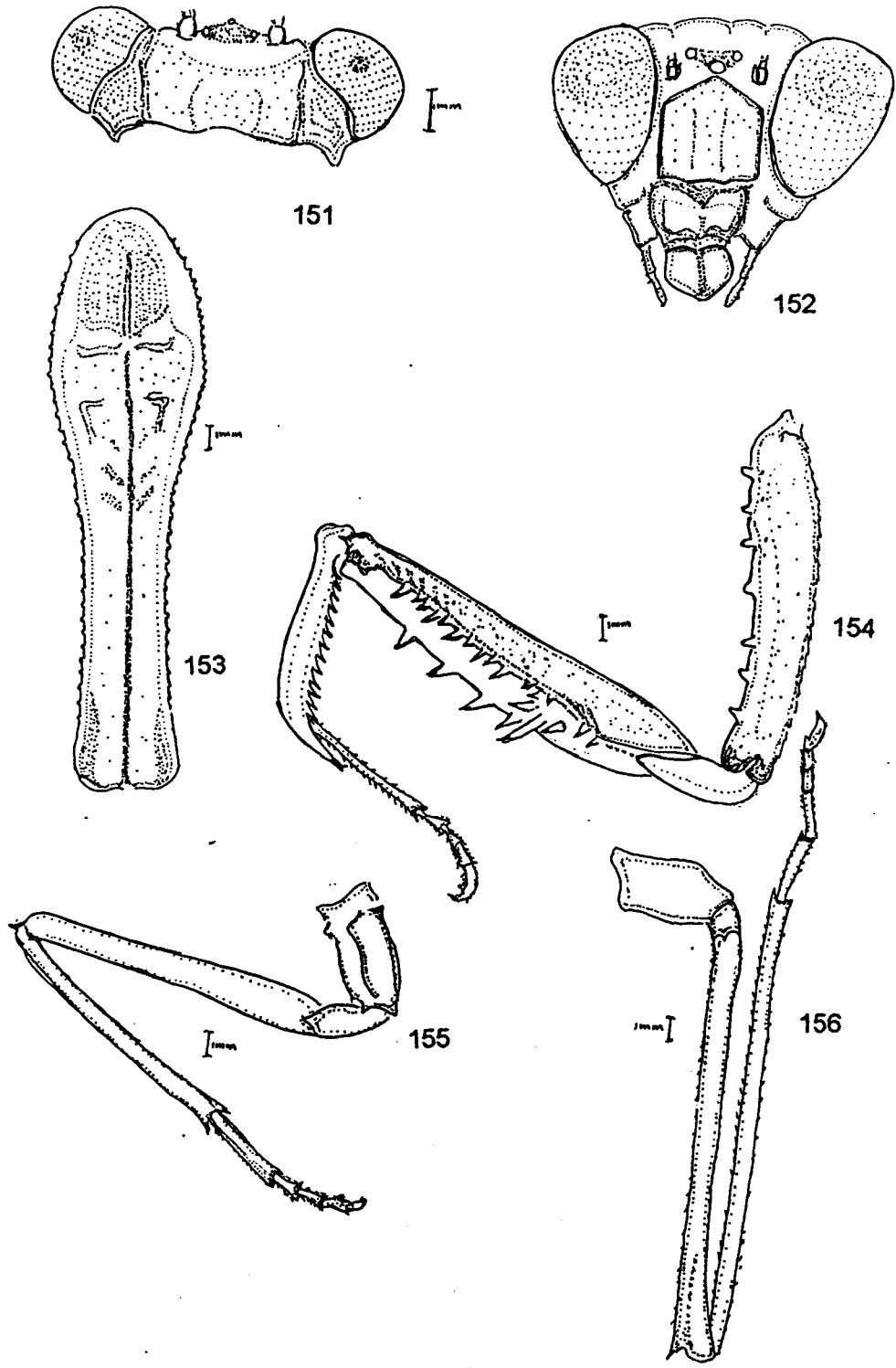


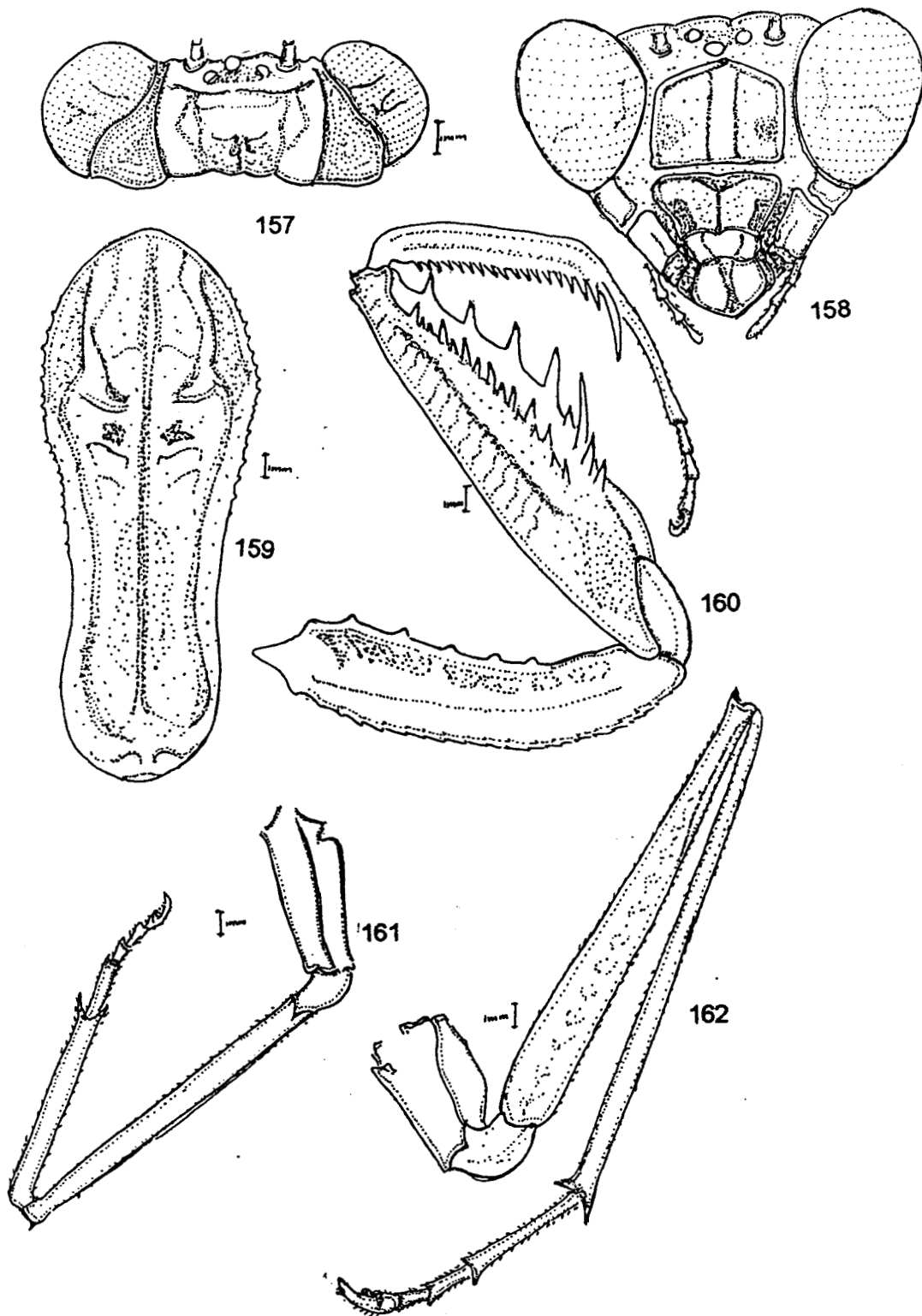
Fig. 150. Hindleg



Figs. 151-156. *Hierodula (Hierodula) saussurei* Kirby

Fig. 151. Head Dorsal view. Fig. 152. Head Ventral view Fig. 153. Mesosoma

Fig. 154. Foreleg. Fig. 155. Midleg Fig. 156. Hindleg



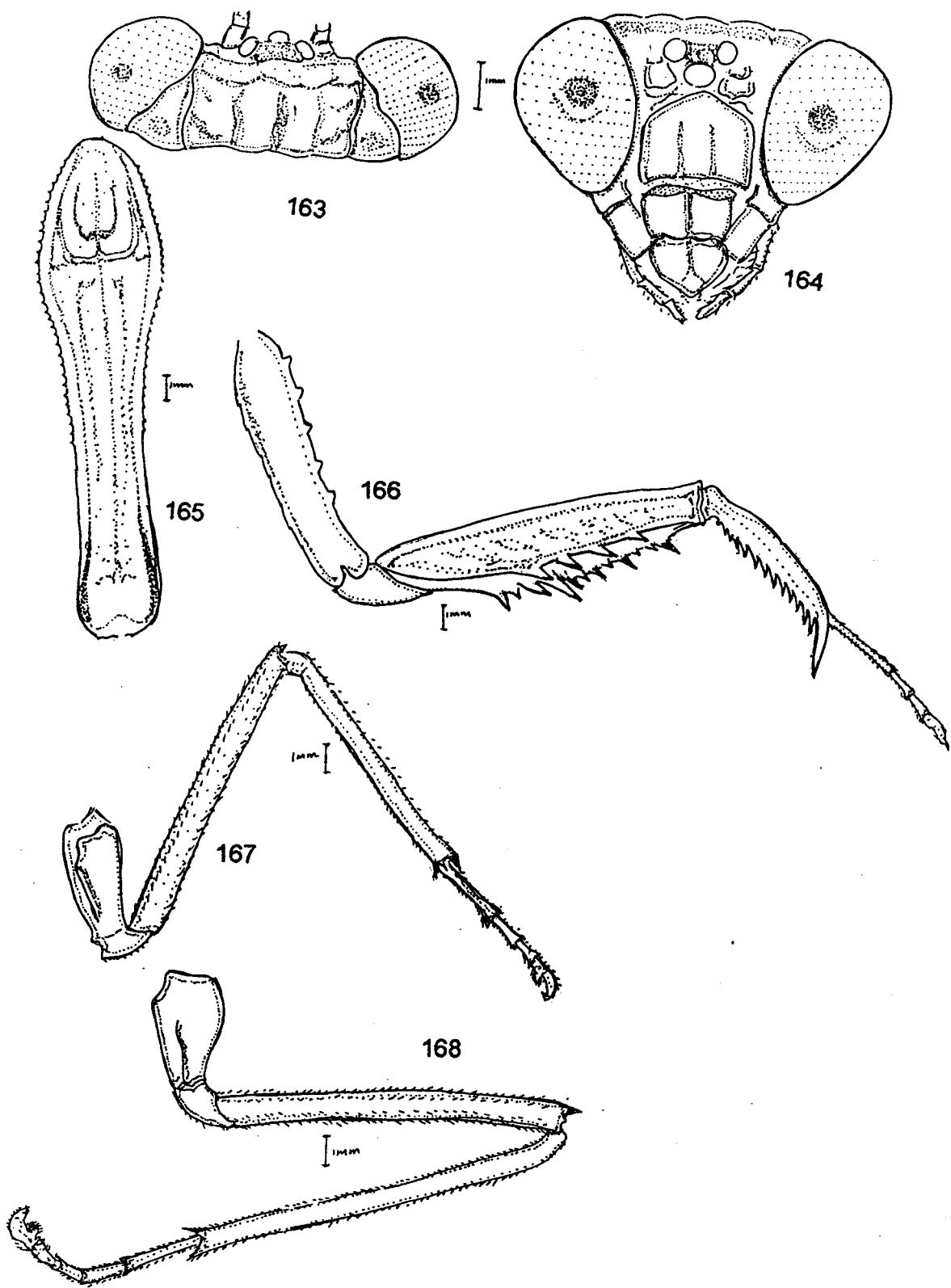
Figs. 157-162. *Hierodula (Hierodula) tenuidentata* Saussure

Fig. 157. Head Dorsal view. Fig. 158. Head Ventral view Fig. 159. Mesosoma

Fig. 160. Foreleg. Fig. 161. Midleg Fig. 162. Hindleg

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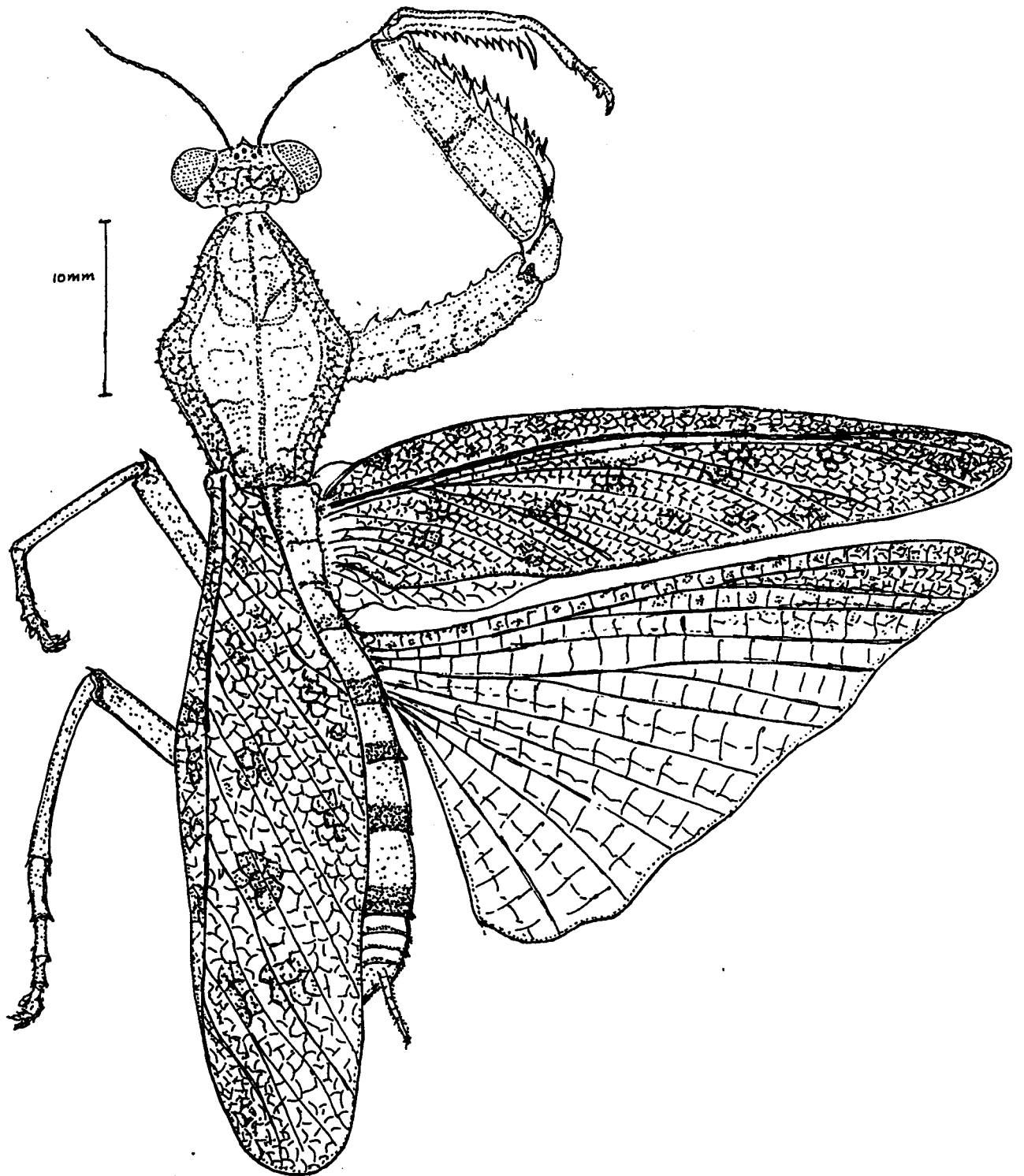


Figs. 163-168. *Hierodula (Hierodula) ventralis* Giglio-Tos

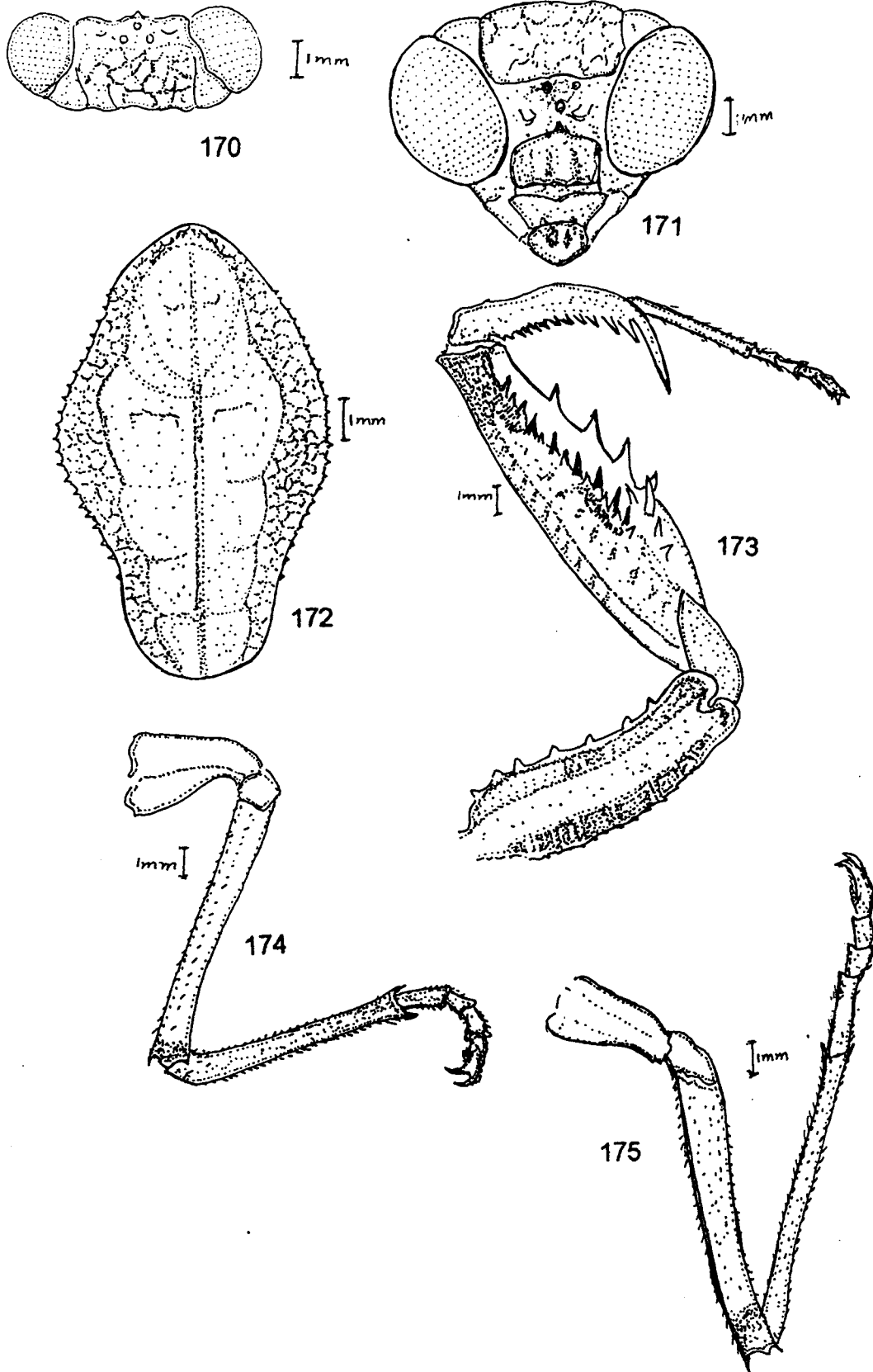
Fig. 163. Head Dorsal view. Fig. 164. Head Ventral view Fig. 165. Mesosoma

Fig. 166. Foreleg. Fig. 167. Midleg Fig. 168. Hindleg

63



169 *Hierodula (Rhombodera) woodmasoni* Werner

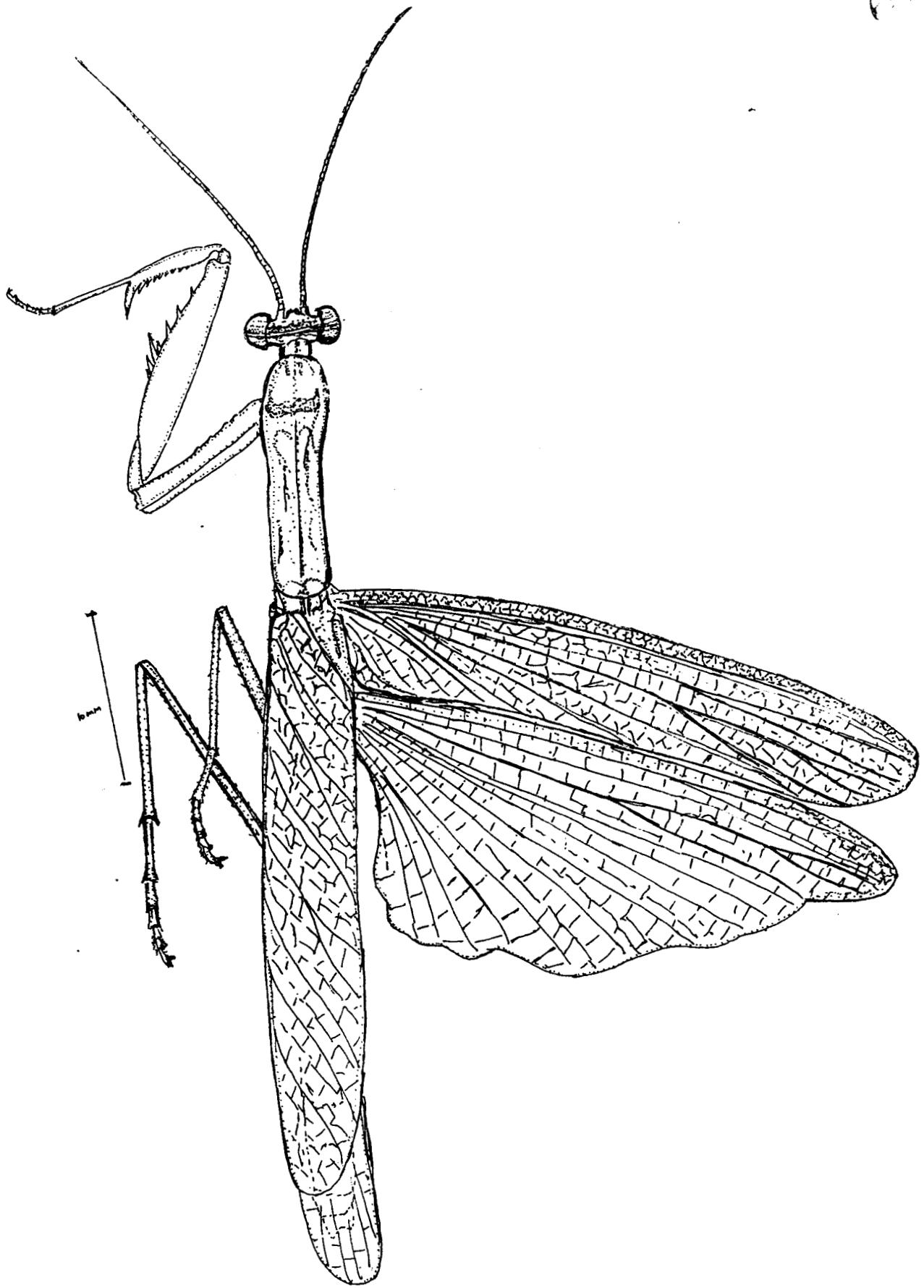


Figs. 169-175. *Hierodula (Rhombodera) woodmasoni* Werner

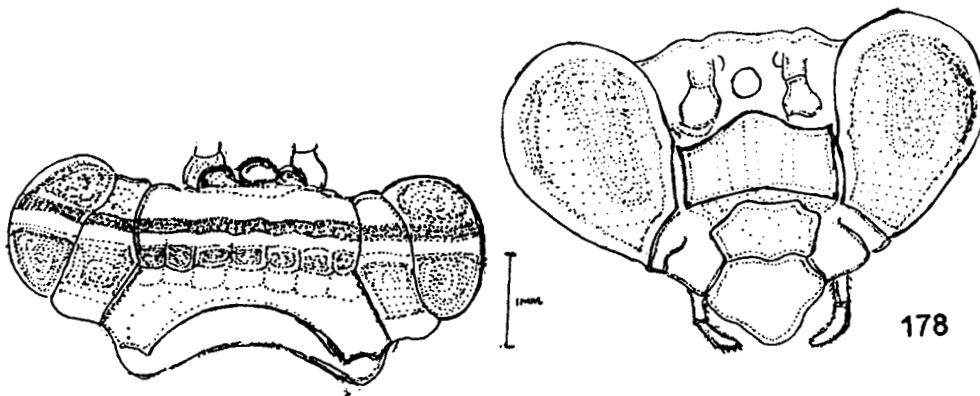
Fig. 170. Head Dorsal view. Fig. 171. Head Ventral view Fig. 172. Mesosoma

Fig. 173. Foreleg. Fig. 174. Midleg Fig. 175. Hindleg

25

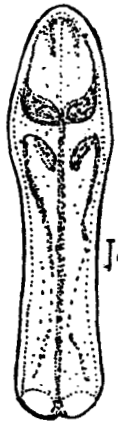


176 *Mantis religiosa* Linnaeus

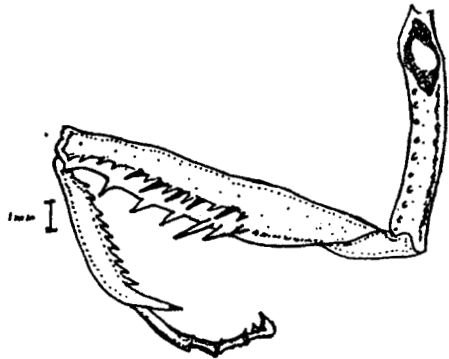


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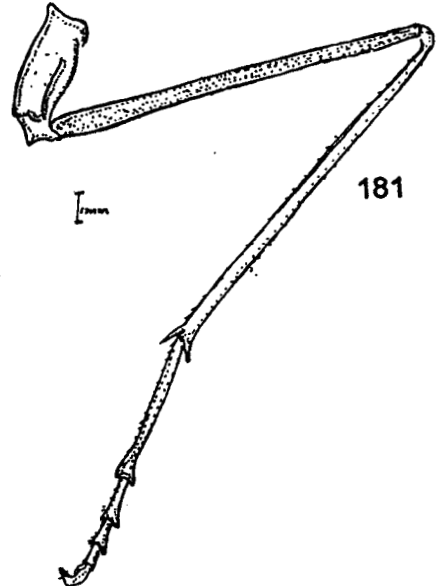
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180

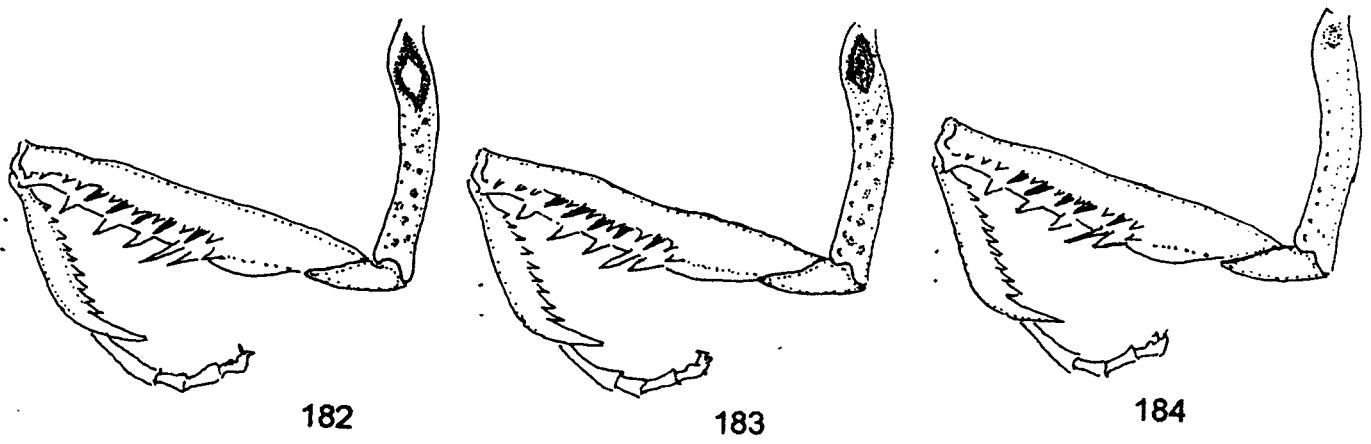


181

Figs. 177-181 *Mantis religiosa* Linnaeus

Fig.177.Head Dorsal view. Fig. 178.Head Ventral view Fig.179. Mesosoma

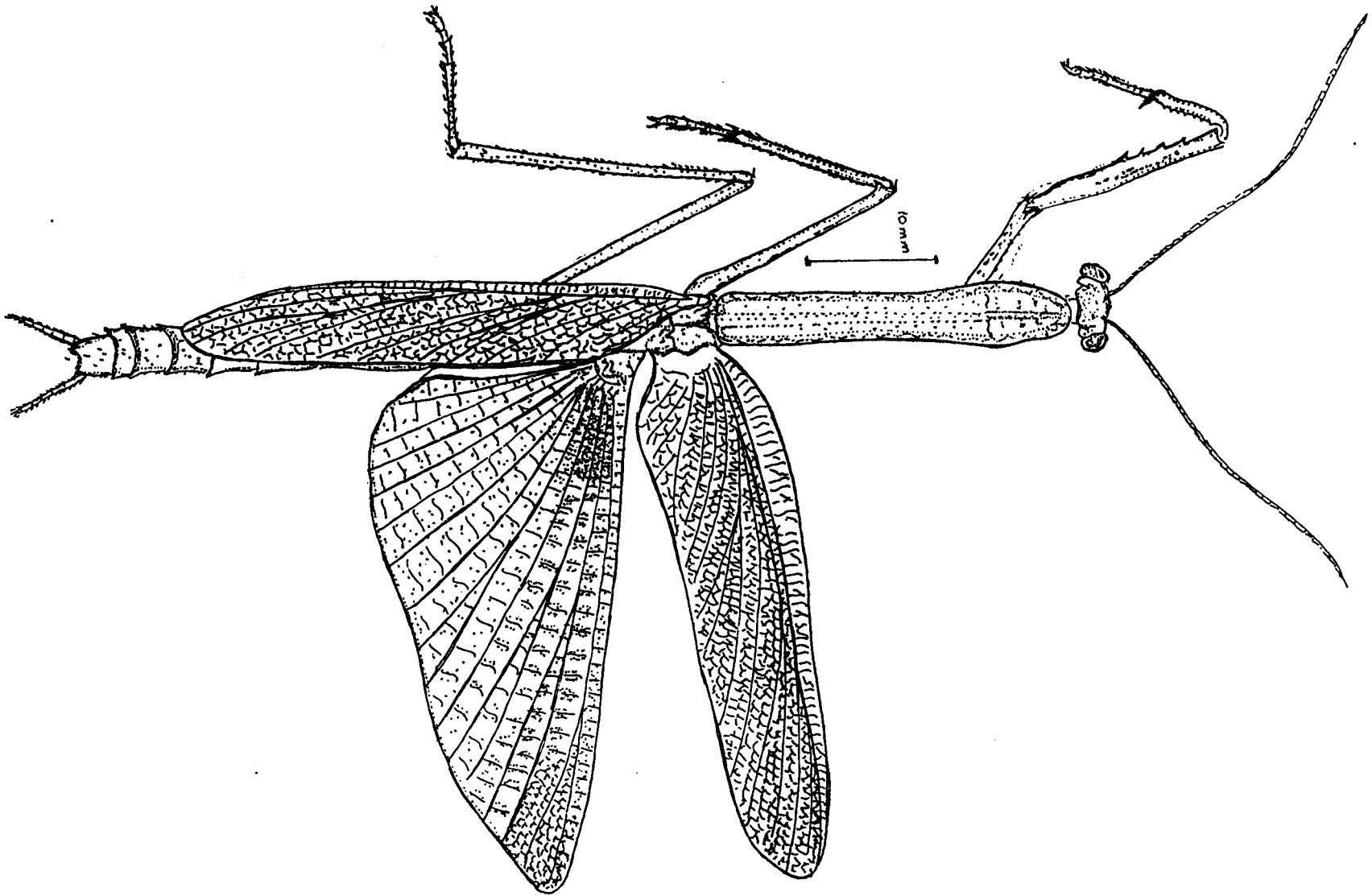
Fig.180.Foreleg. Fig.181.Hindleg



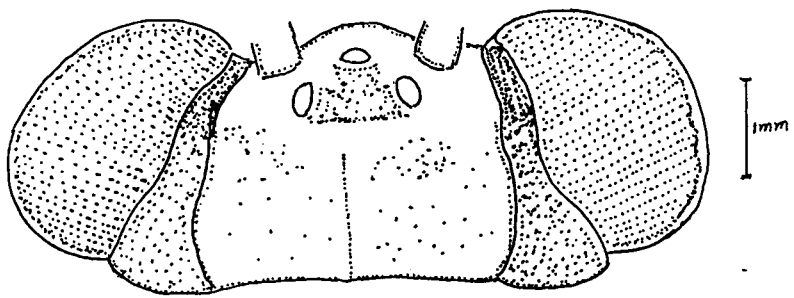
Figs. 182 -184 *Mantis religiosa* Linnaeus Variations(Forelegs)
Fig. 182. Variation I Fig. 183.Variation II Fig.184. Variation III

89

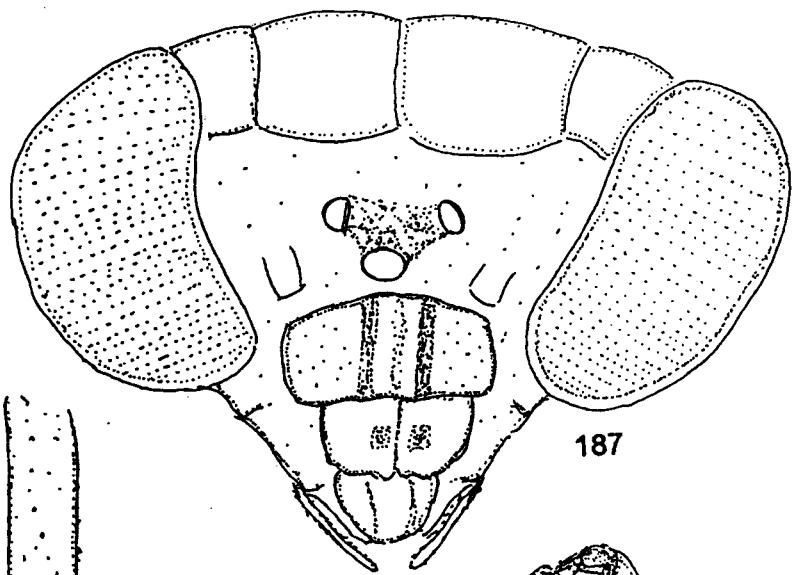
185 *Plistospiota nova* Beier



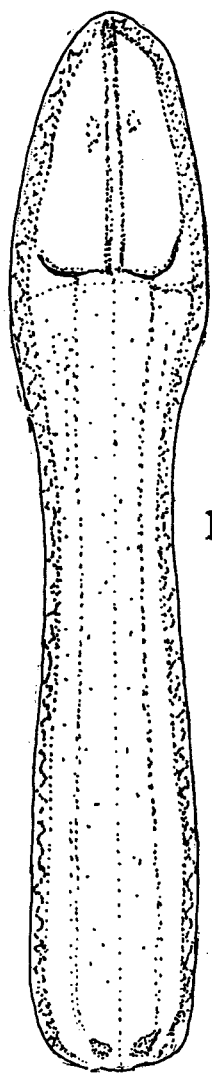
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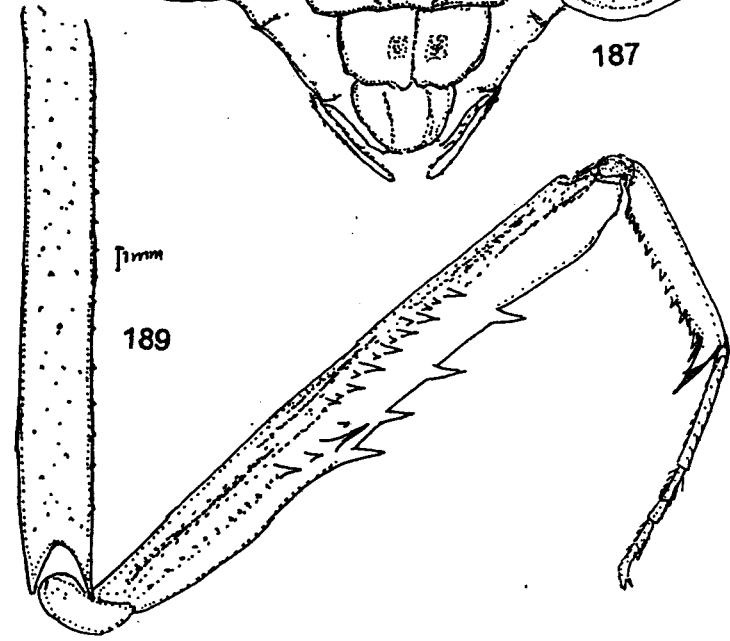
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187



188



189

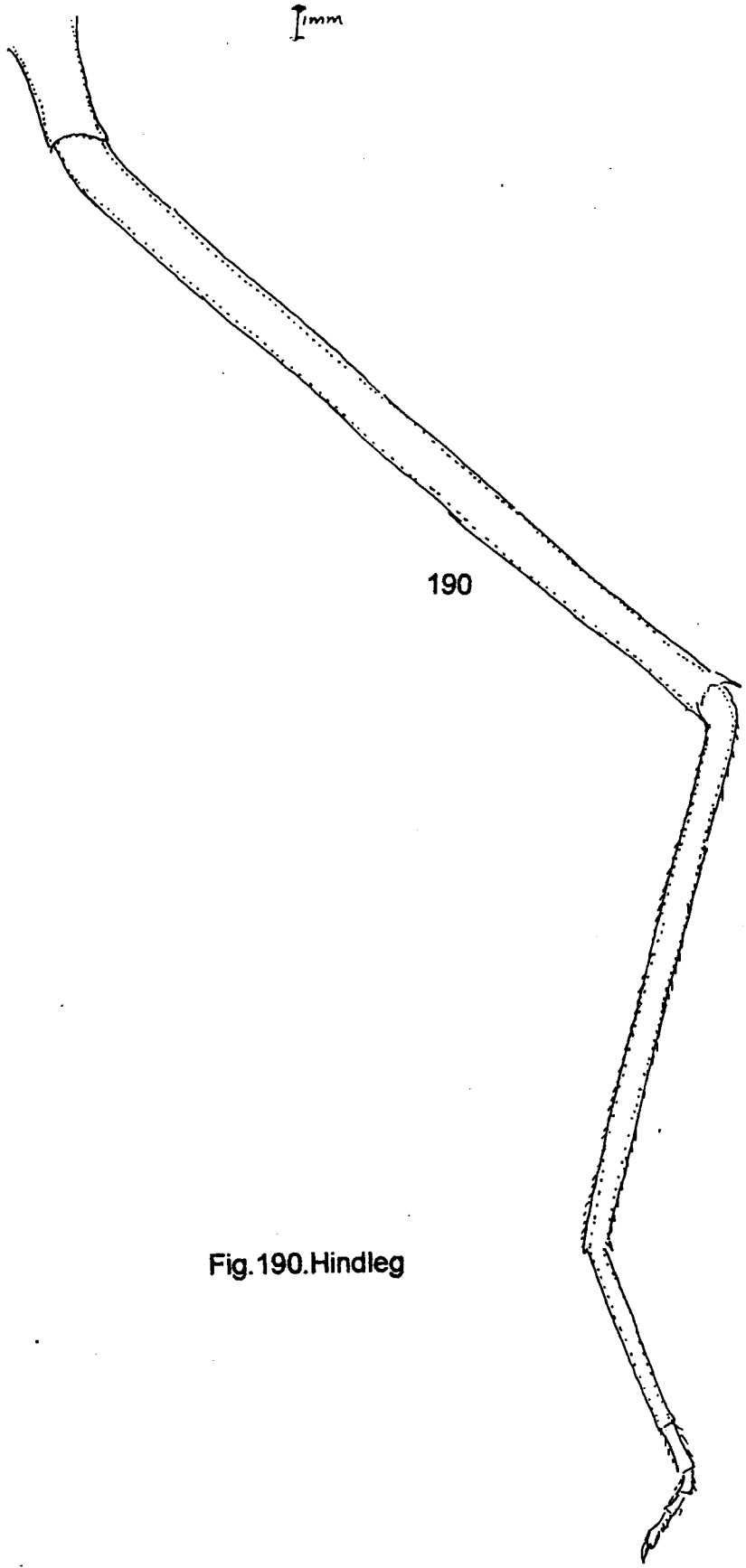
Figs. 186 -190. *Plistospilota nova* Beier

Fig.186.Head Dorsal view. Fig. 187.Head Ventral view Fig.188. Mesosoma

Fig.189.Foreleg.

90

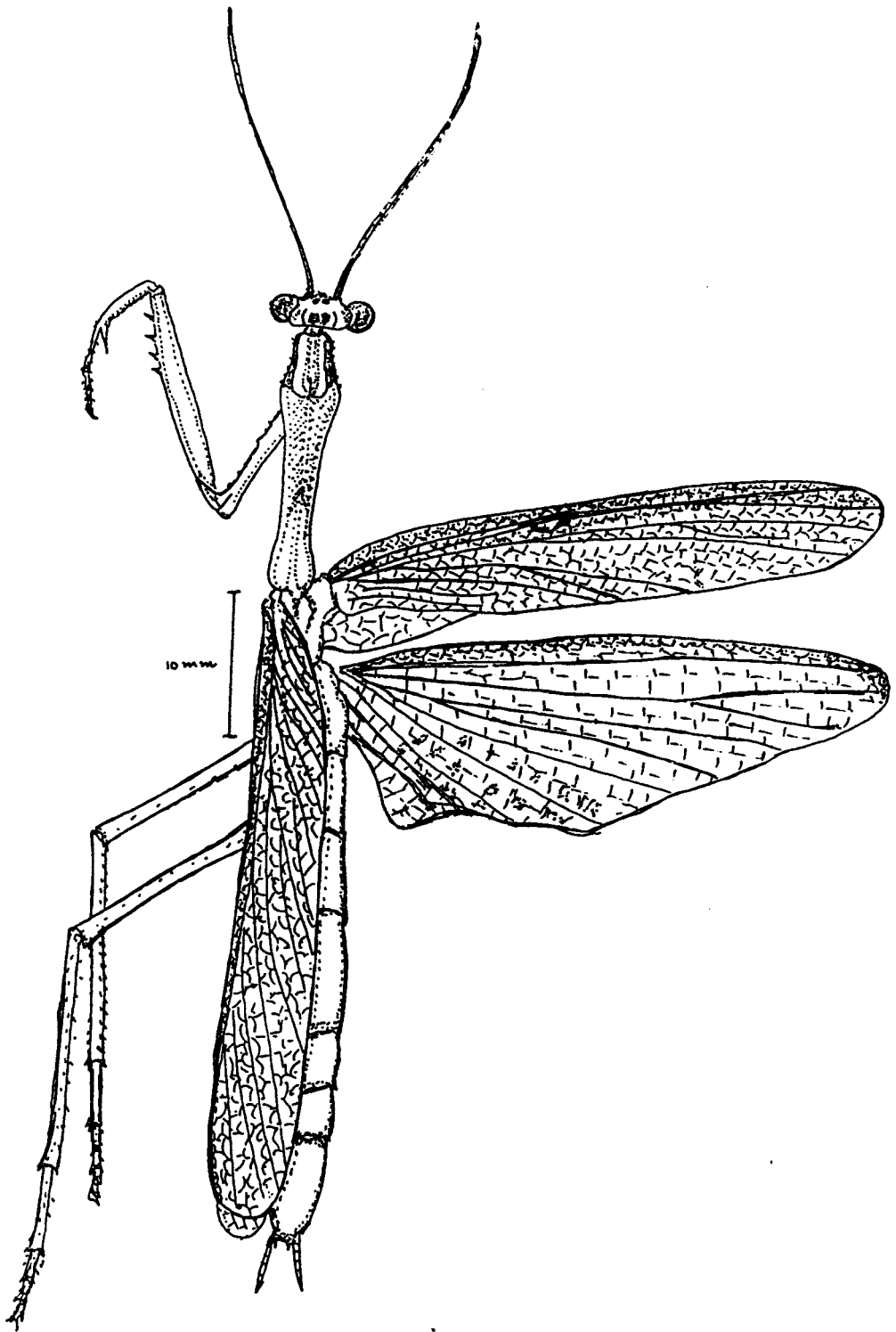
2286



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Fig. 190. Hindleg

100



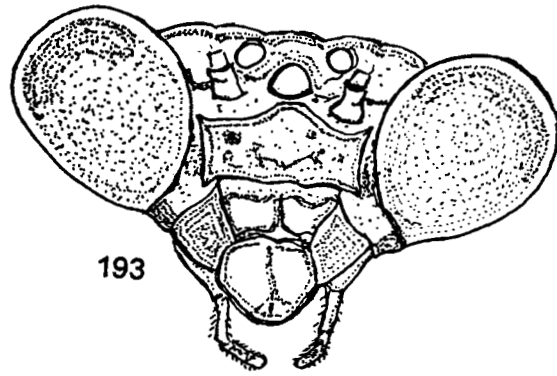
191 *Statilia nemoralis* (Saussure)

92

Fig. 192-196



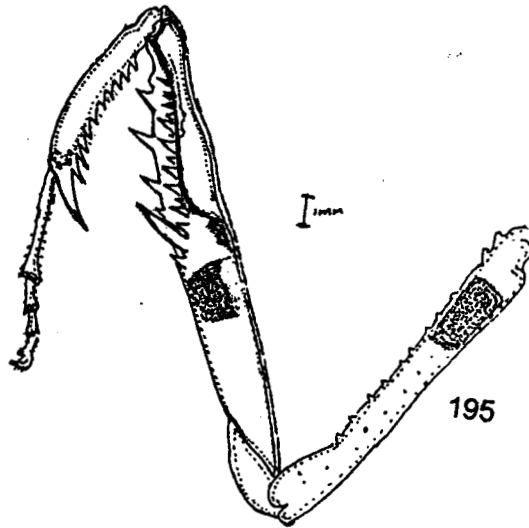
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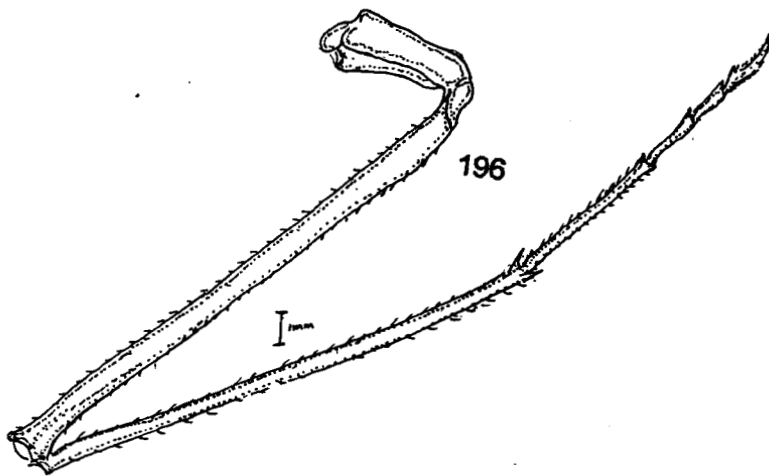
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194



195



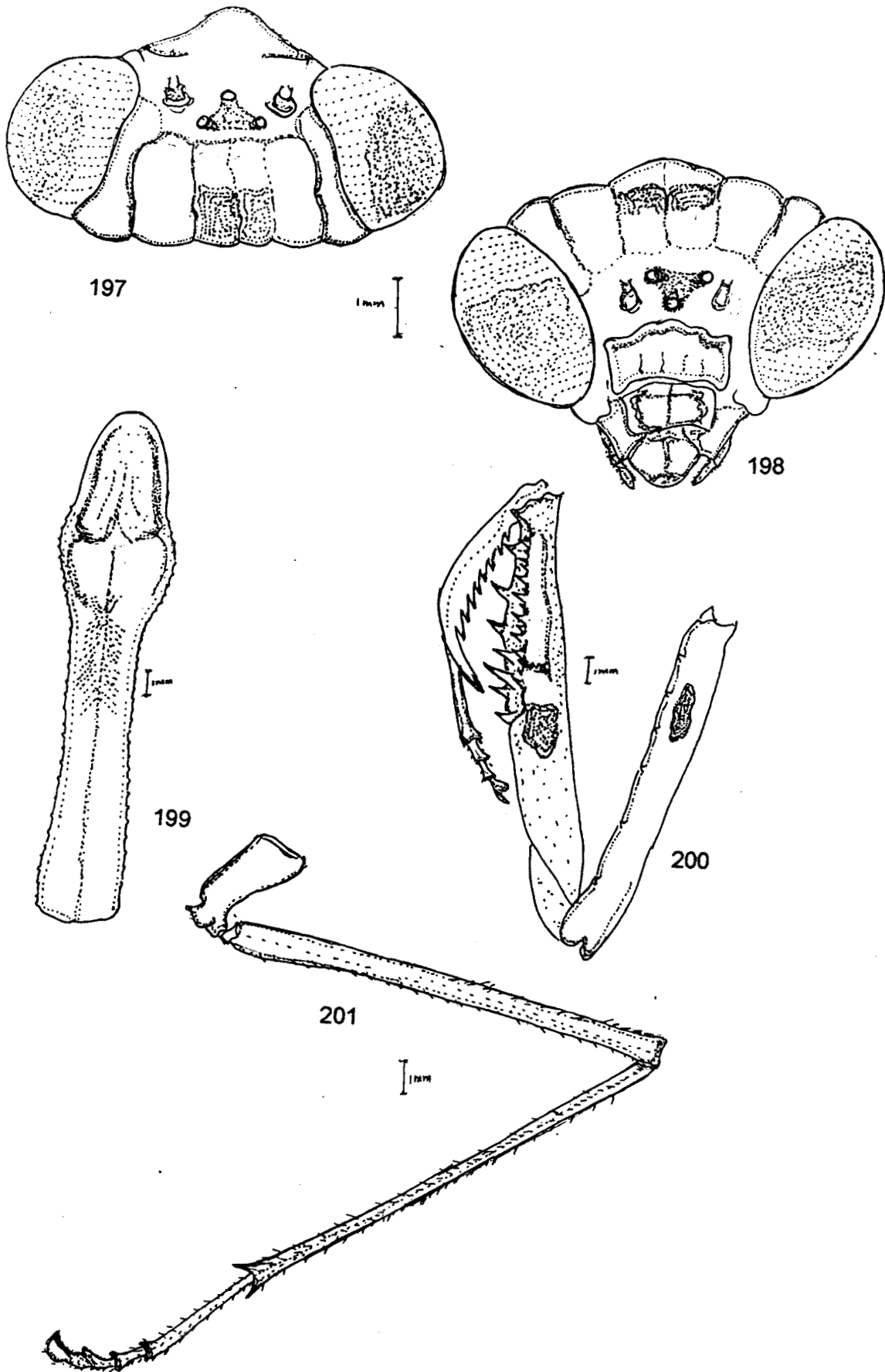
196

Figs. 192 -196. *Statilia maculata* (Thunberg)

Fig.192.Head Dorsal view. Fig. 193.Head Ventral view Fig.194. Mesosoma

Fig.195.Foreleg. Fig.196.Hindleg

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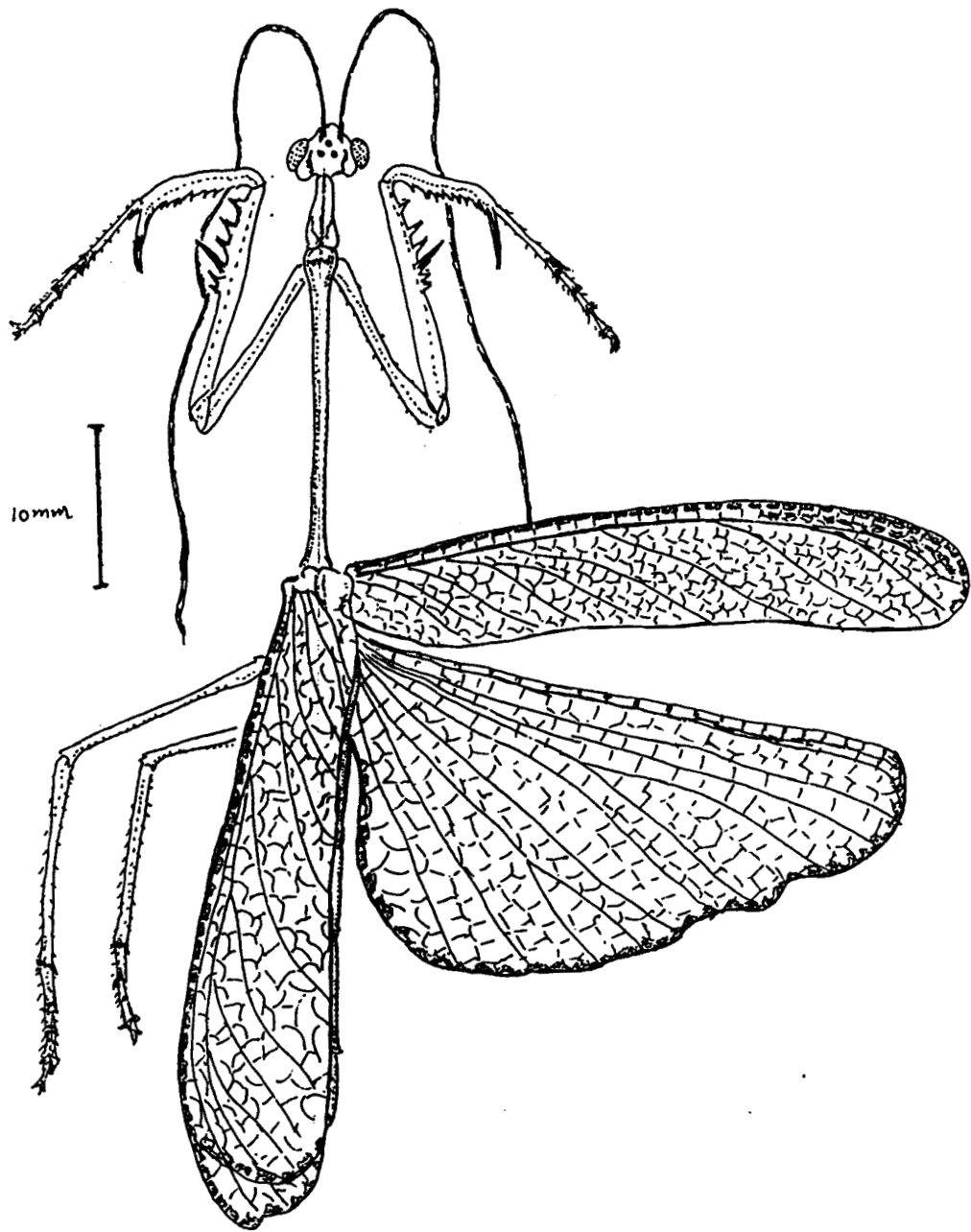


Figs. 197 -201. *Statilia nemoralis* (Saussure)

Fig.197.Head Dorsal view. Fig. 198.Head Ventral view Fig.199. Mesosoma

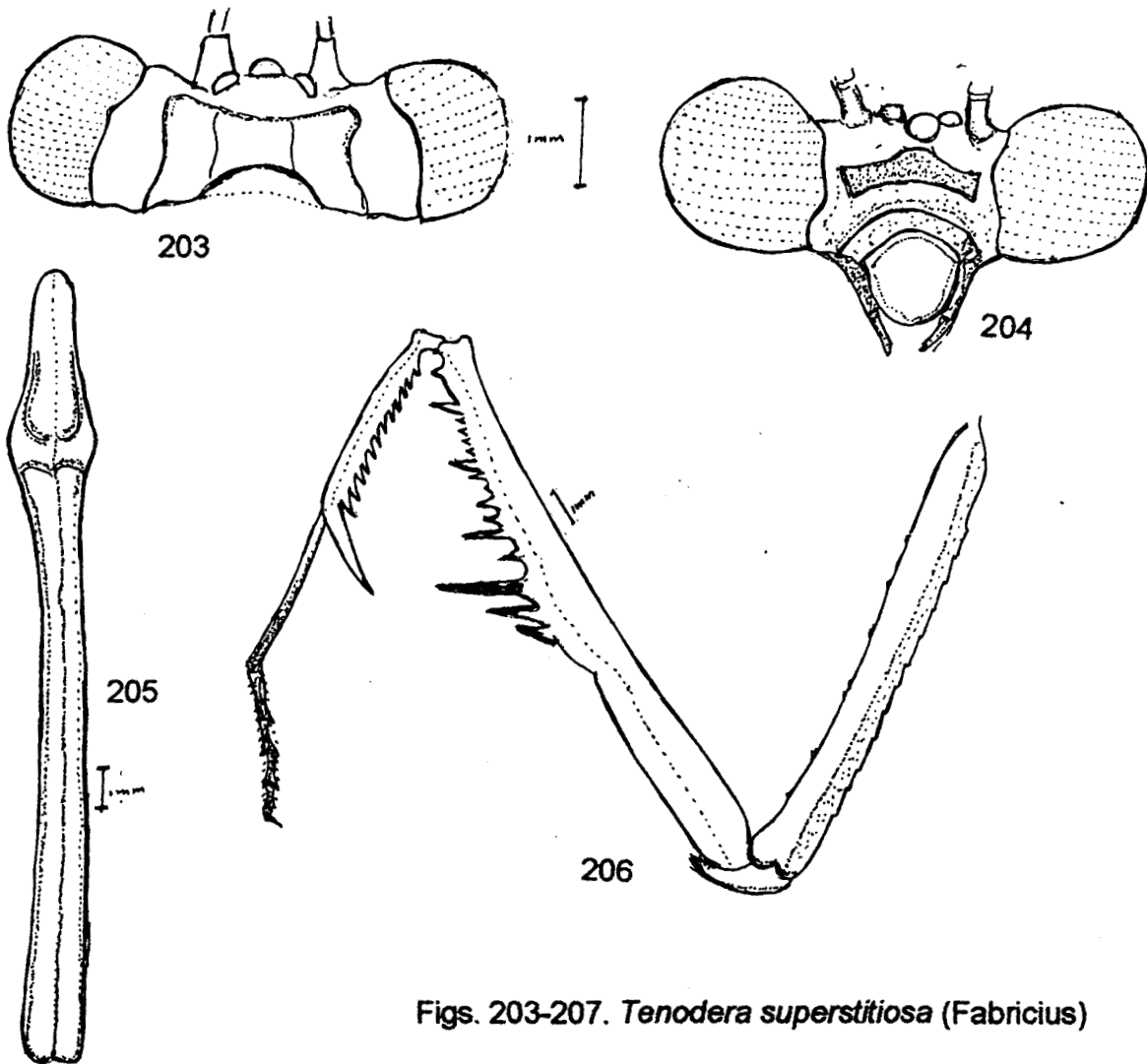
Fig.200.Foreleg. Fig.201.Hindleg

44



202 *Tenodera superstitiosa* (Fabricius)

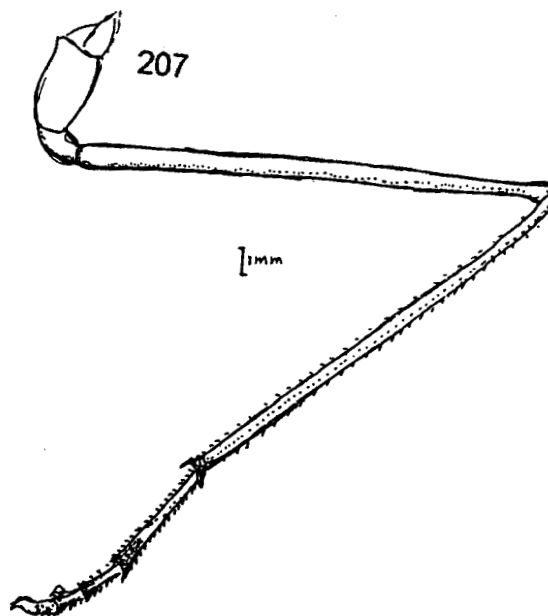
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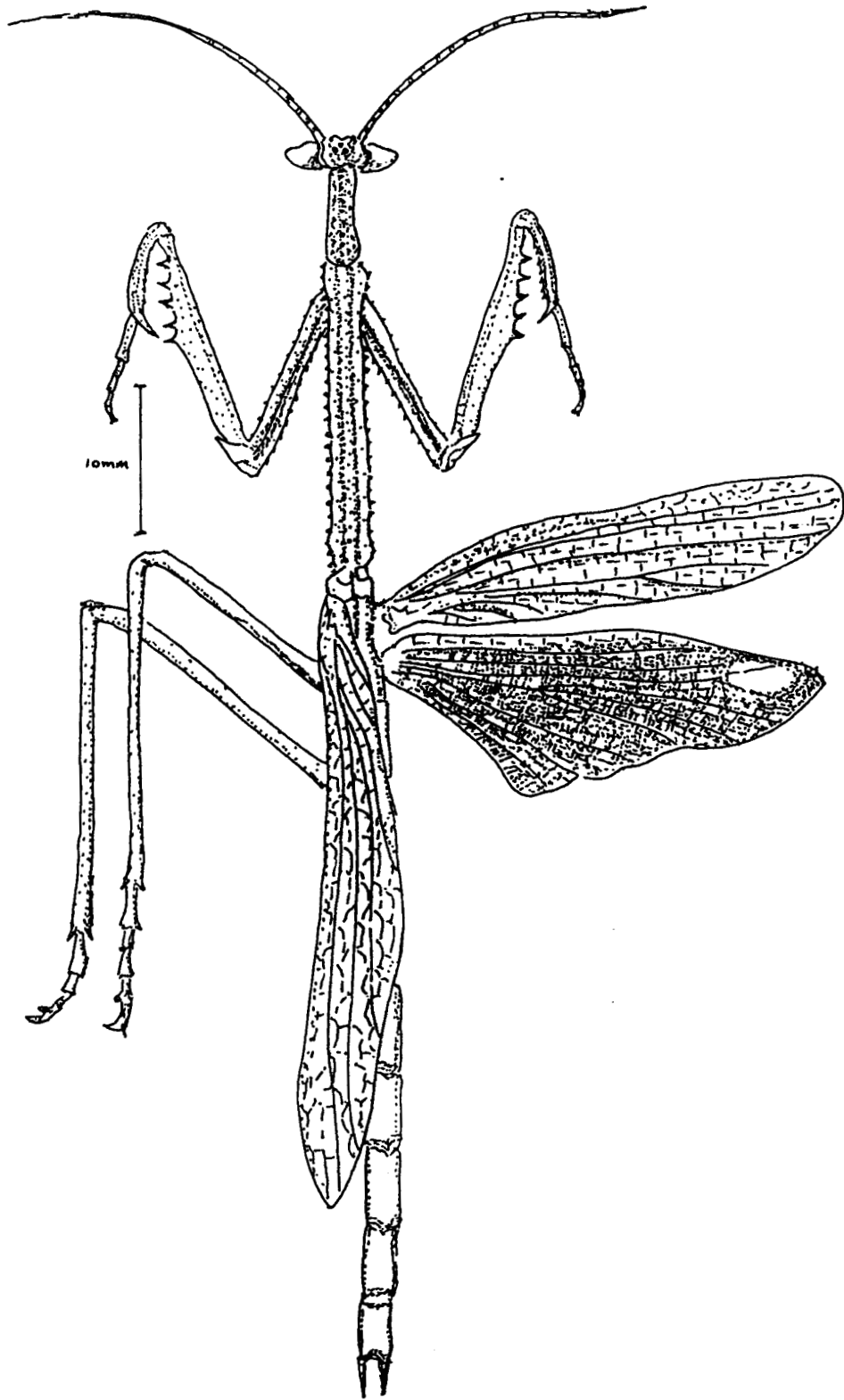
Figs. 203-207. *Tenodera superstitiosa* (Fabricius)

Fig.203.Head Dorsal view. Fig. 204.Head Ventral view Fig.205. Mesosoma

Fig.206.Foreleg. Fig.207.Hindleg



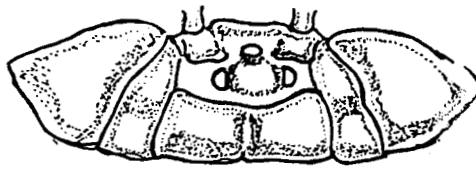
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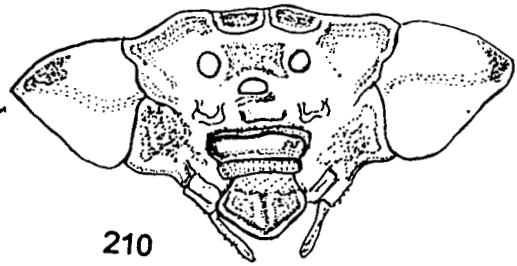
208

Deiphobella laticeps (Wood-Mason)

47



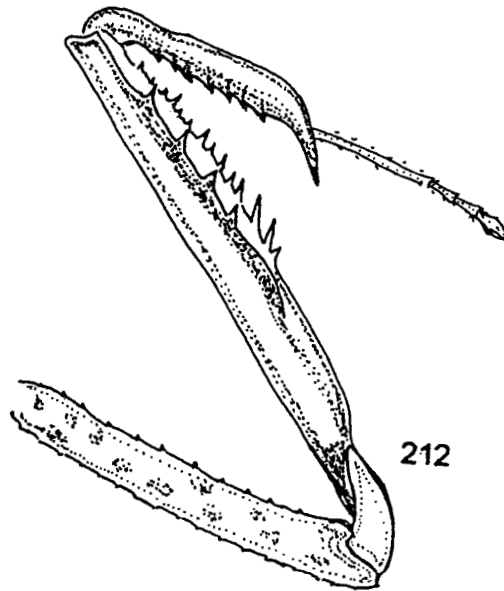
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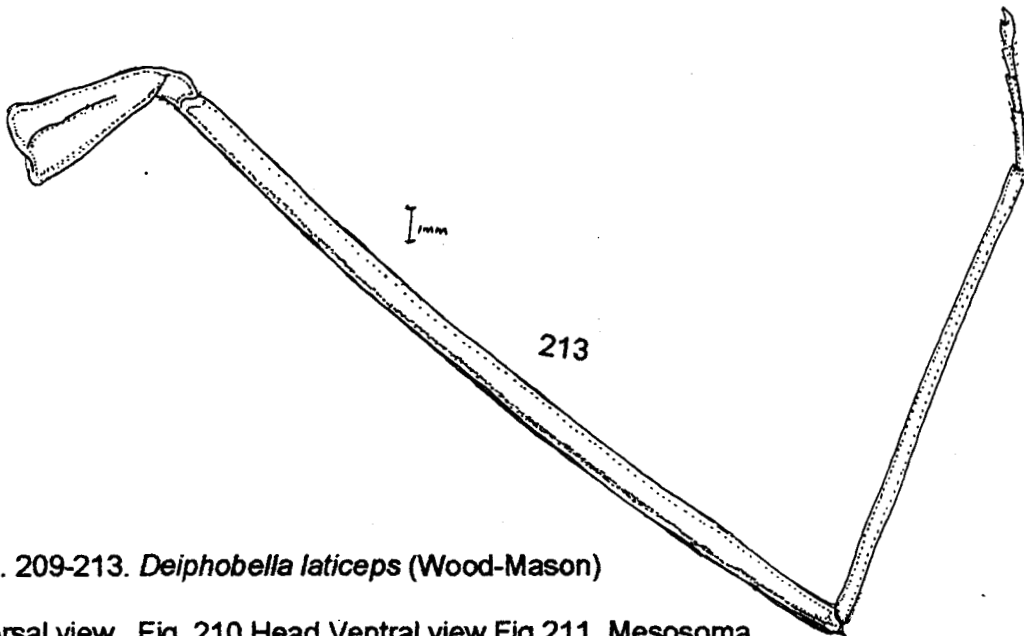
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211



212



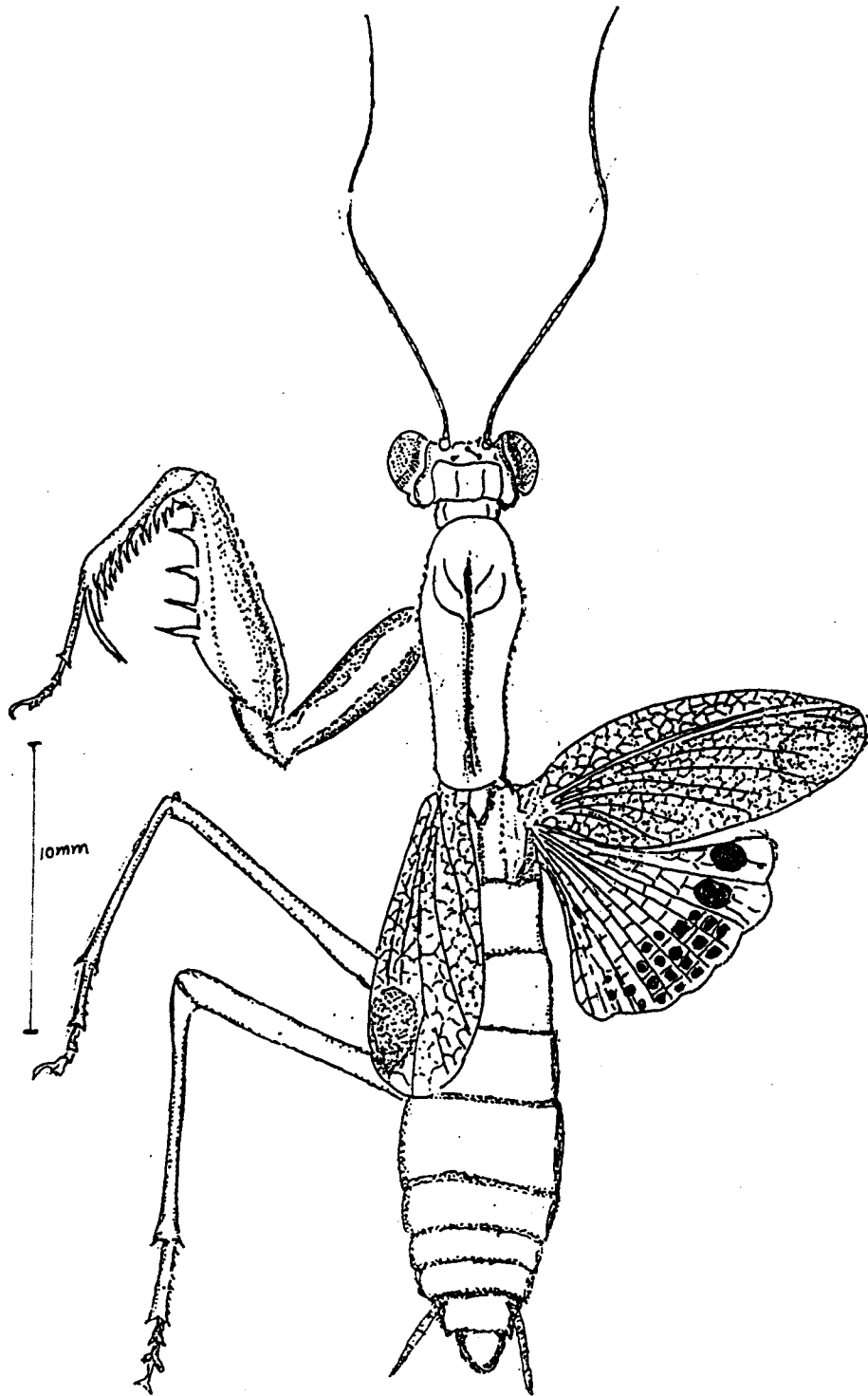
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Figs. 209-213. *Deiphobella laticeps* (Wood-Mason)

Fig.209.Head Dorsal view. Fig. 210.Head Ventral view Fig.211. Mesosoma

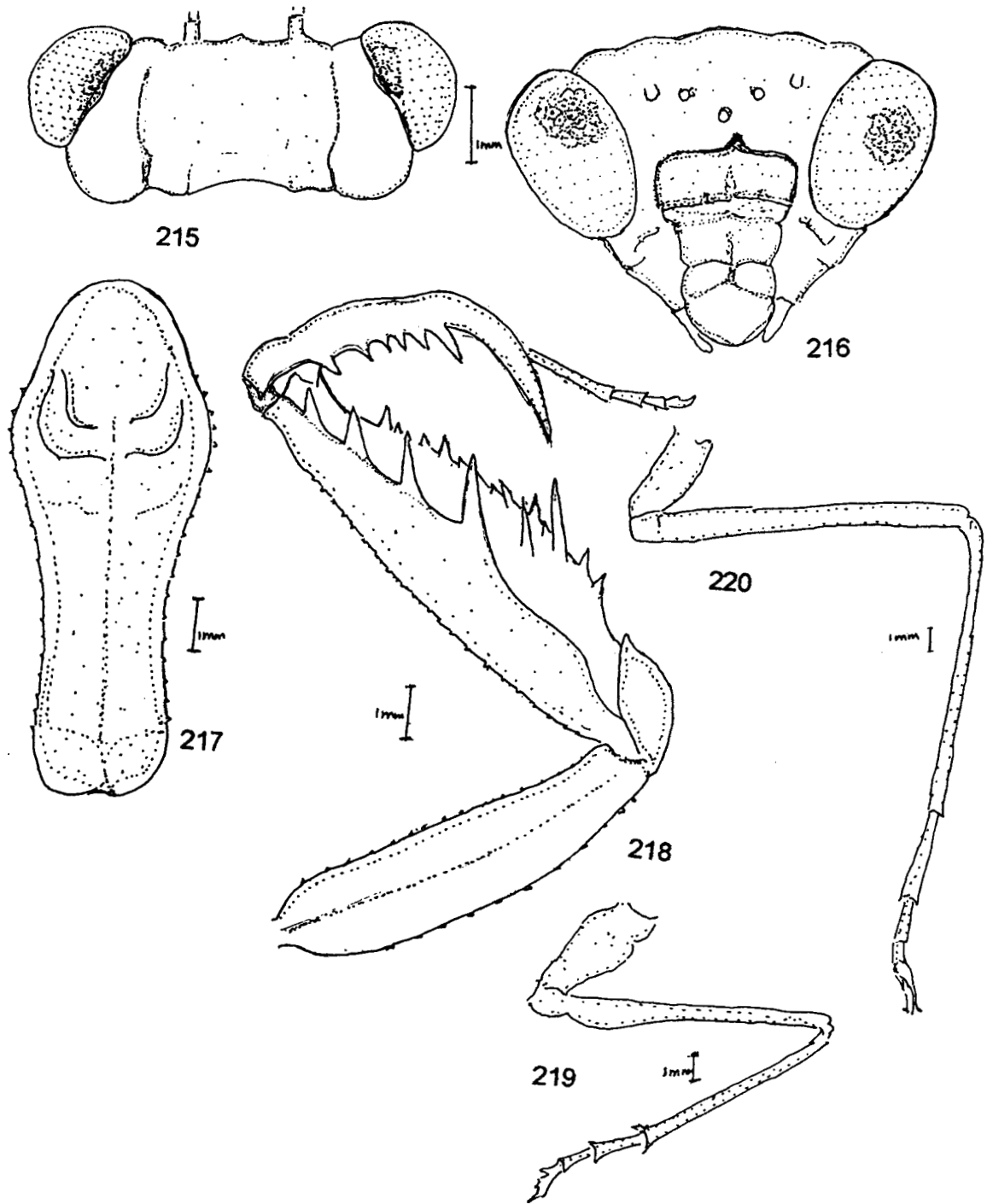
Fig.212.Foreleg. Fig.213.Hindleg

ASH



214 *Iris keralensis* sp.nov.

79

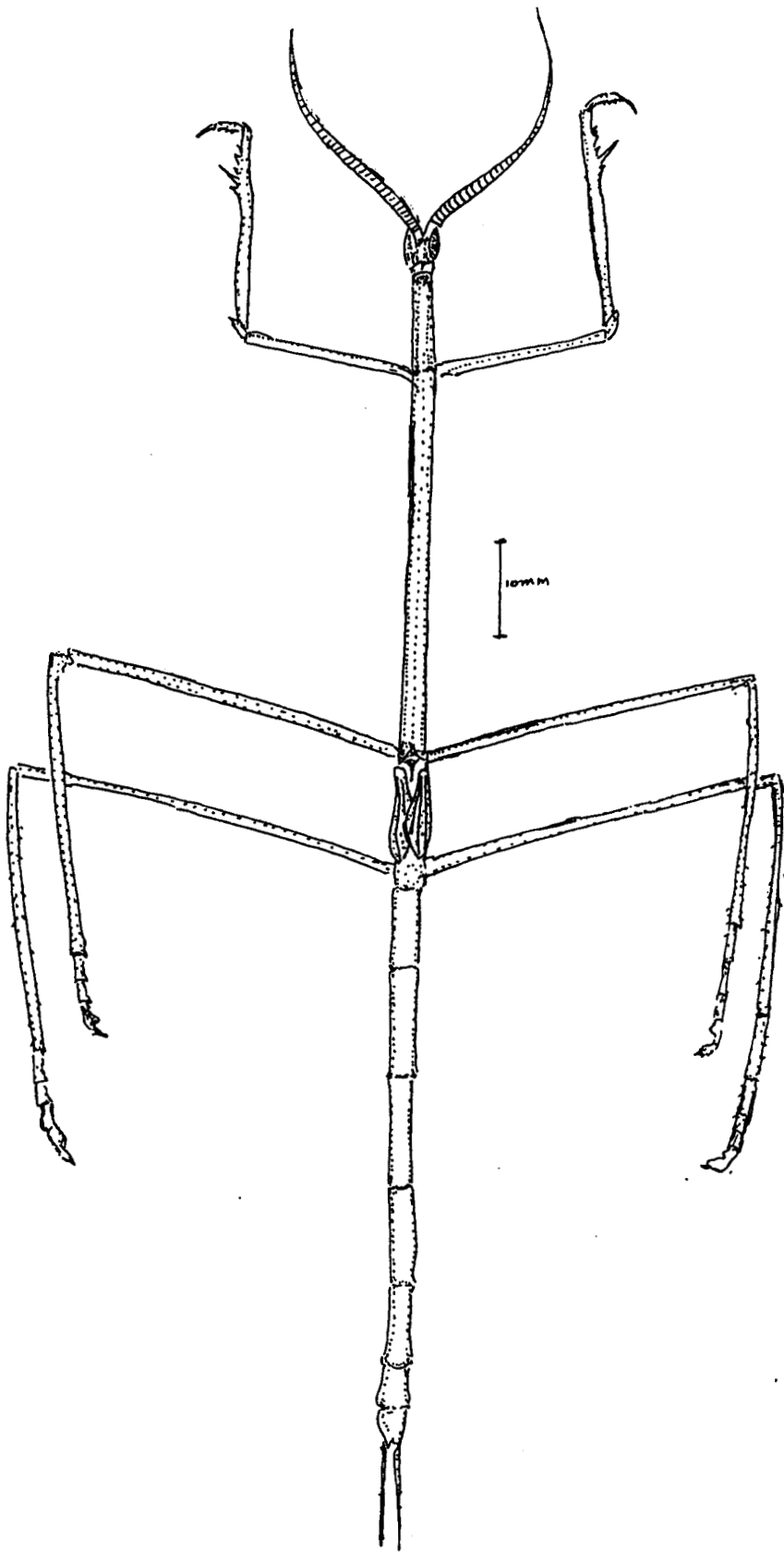


Figs. 215-220. *Iris keralensis* sp. nov.

Fig. 215. Head Dorsal view. Fig. 216. Head Ventral view Fig. 217. Mesosoma

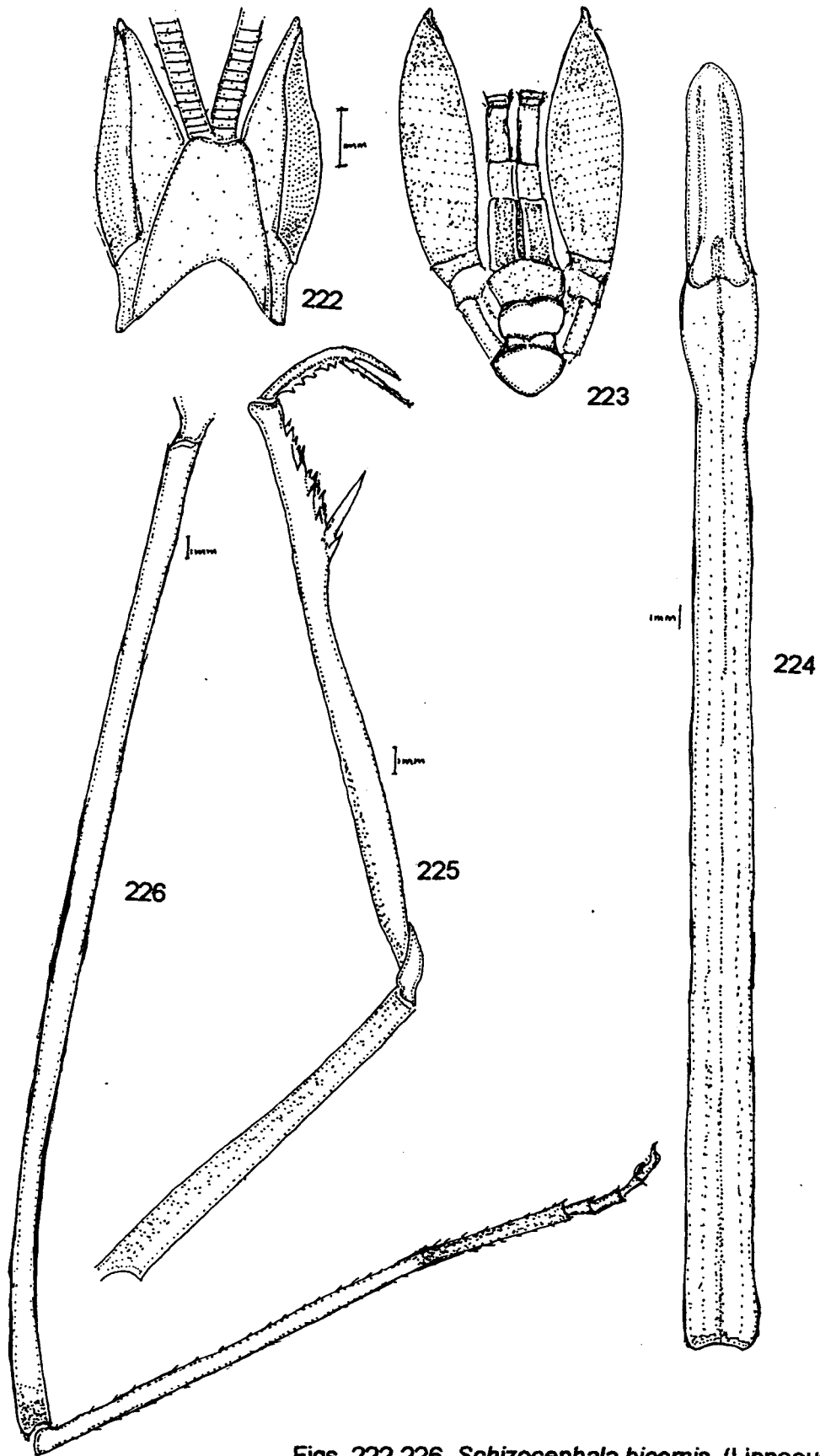
Fig. 218. Foreleg. Fig. 219. Midleg Fig. 220. Hindleg

156



221 *Schizocephala bicornis* (Linnaeus)

101

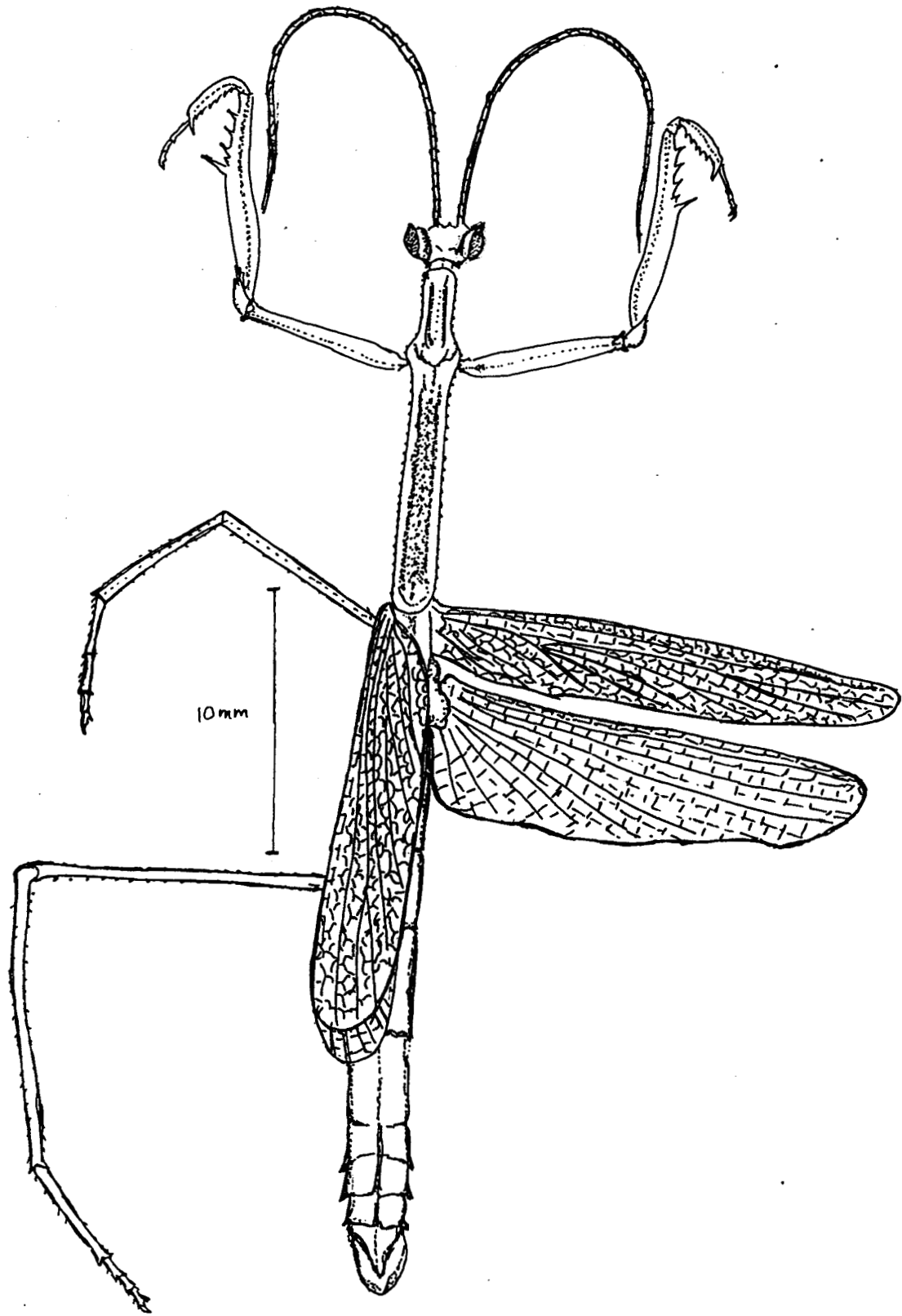


Figs. 222-226. *Schizocephala bicornis* (Linnaeus)

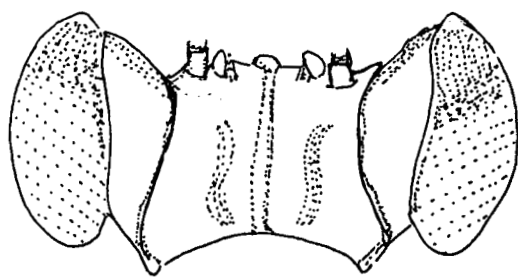
Fig.222.Head Dorsal view. Fig. 223.Head Ventral view Fig.224. Mesosoma

Fig.225.Foreleg. Fig.226.Midleg

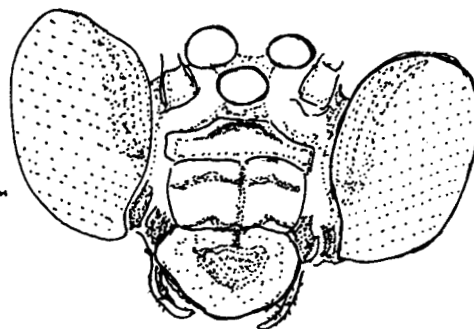
807



227 *Parathespis humbertiana* Saussure



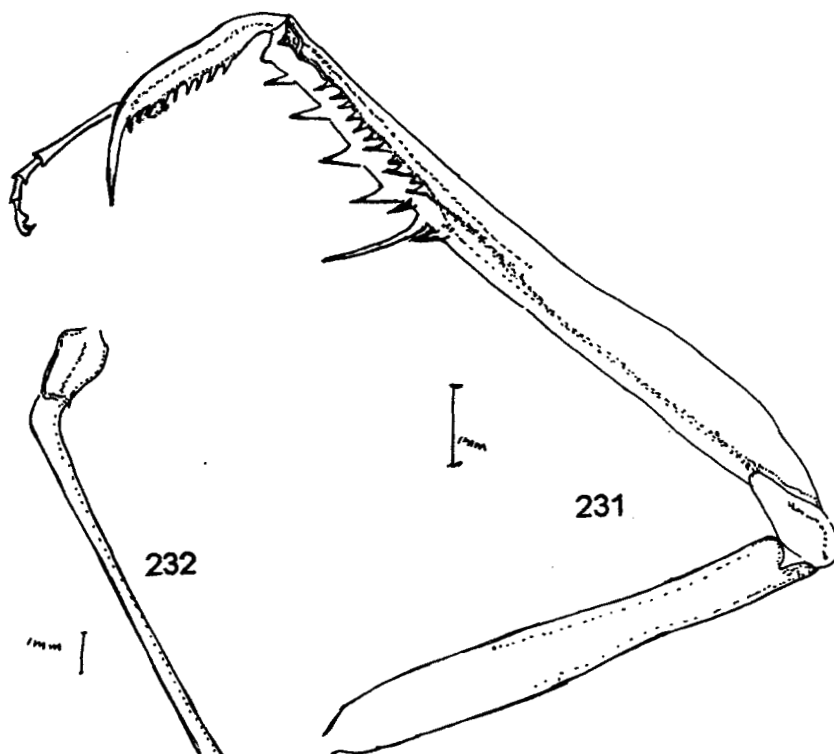
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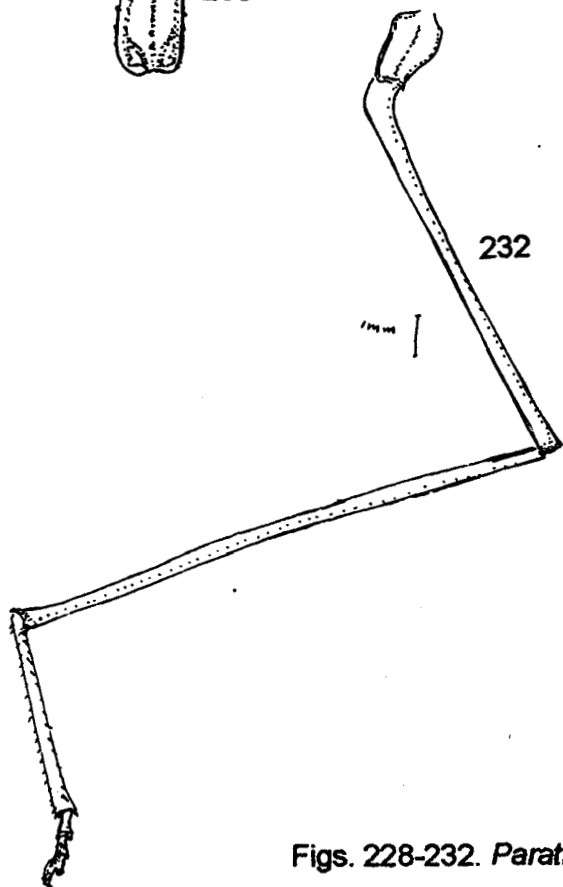
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232

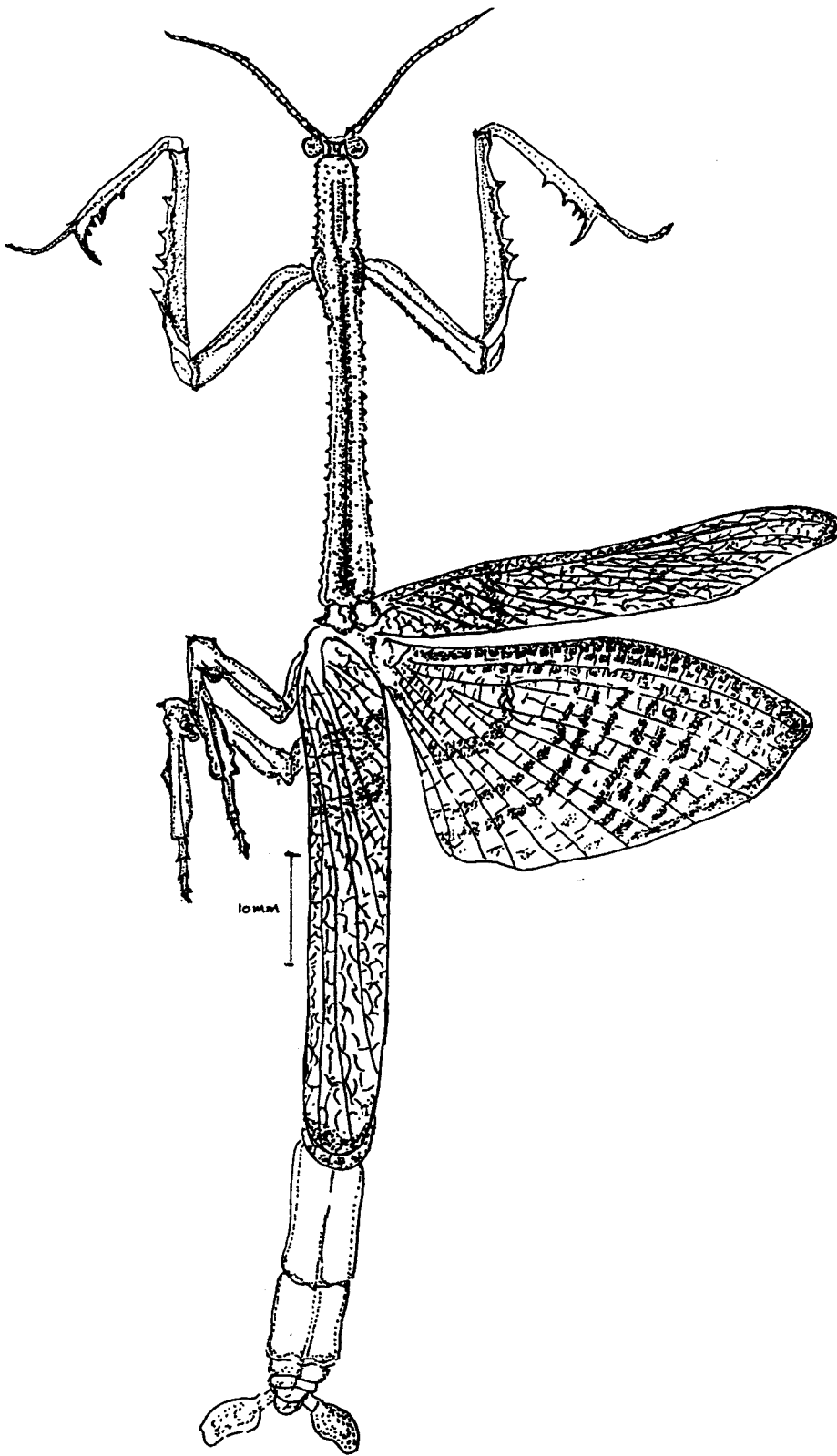
Figs. 228-232. *Parathespis humbertiana* Saussure

Fig.228.Head Dorsal view. Fig. 229.Head Ventral view Fig.230. Mesosoma

Fig.231.Foreleg. Fig.232.Hindleg

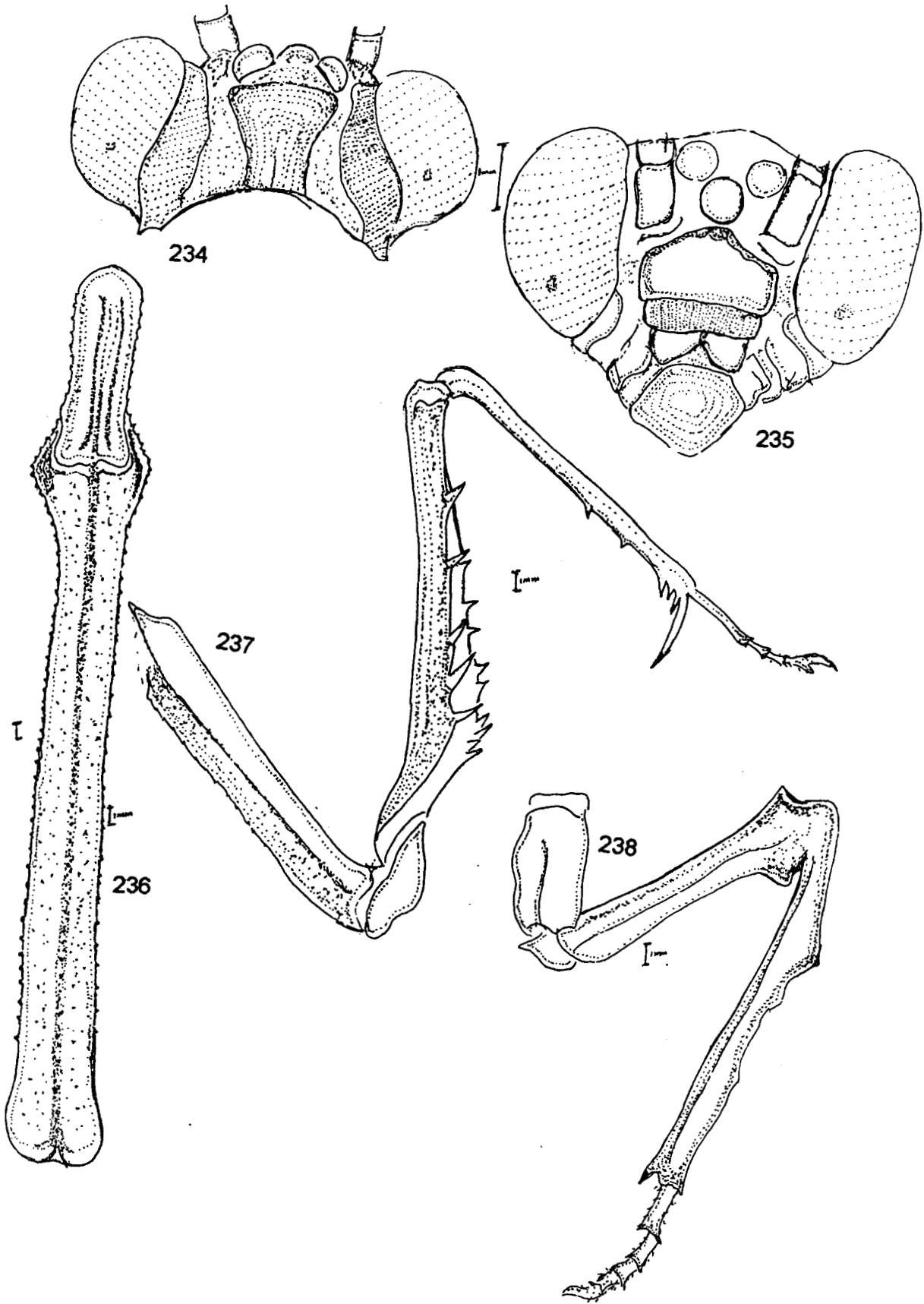
104

762



233 *Aethalochroa ashmoliana* (Westwood)

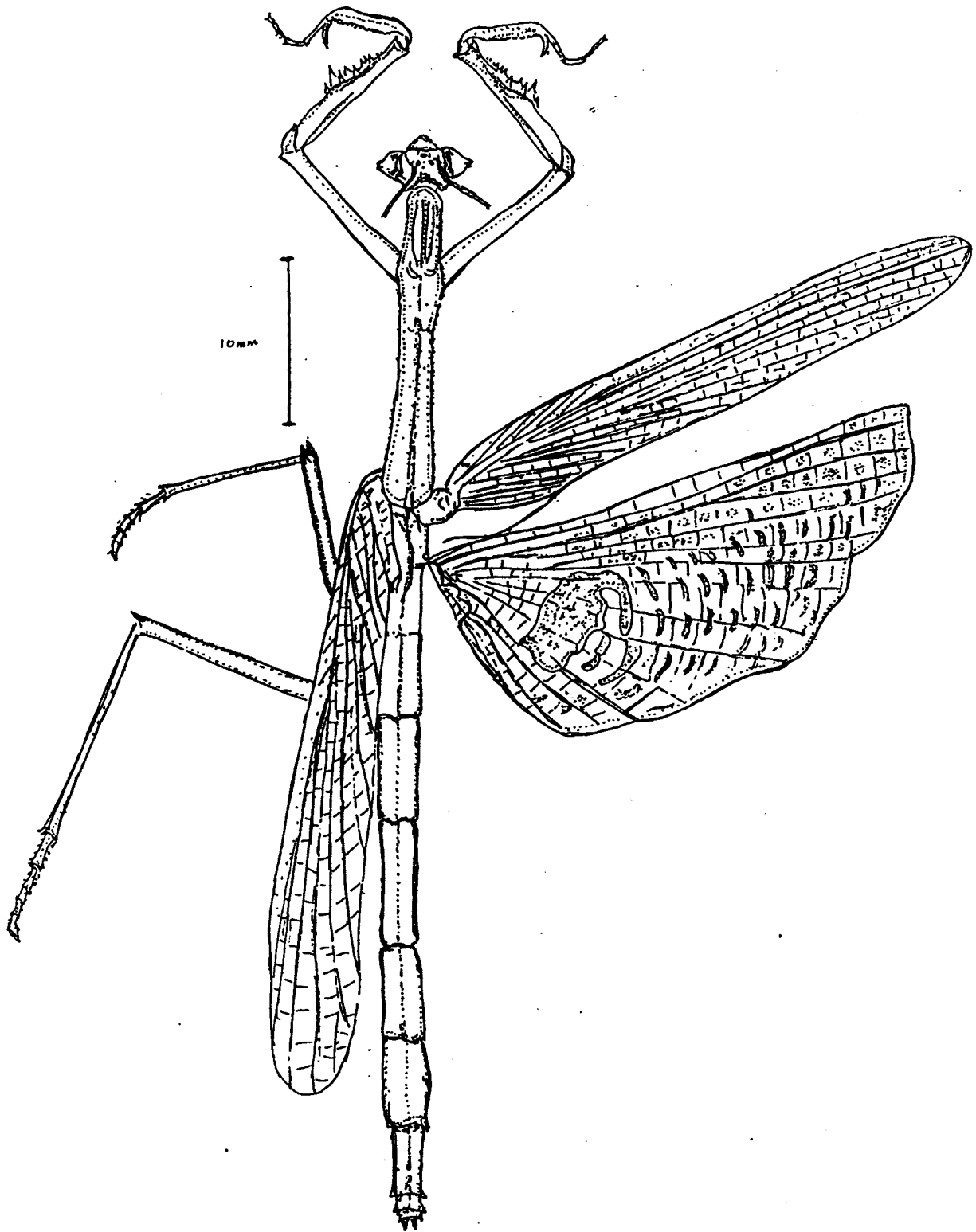
105



Figs. 234-238. *Aethalochroa ashmoliana* (Westwood)

Fig.234.Head Dorsal view. Fig. 235.Head Ventral view. Fig.236. Mesosoma

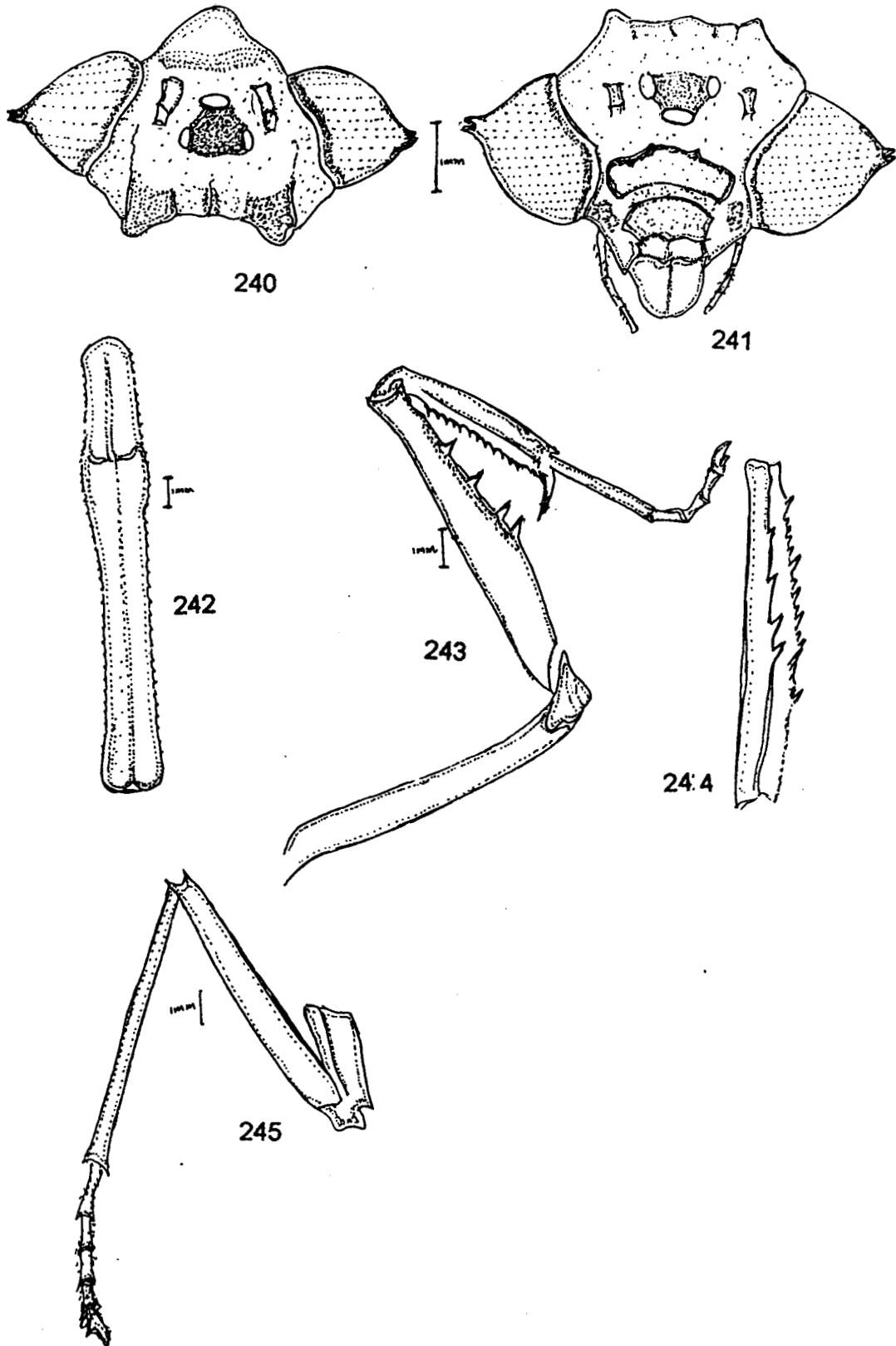
Fig.237.Foreleg. Fig.238.Hindleg



239 *Cheddikulama straminea* Henry

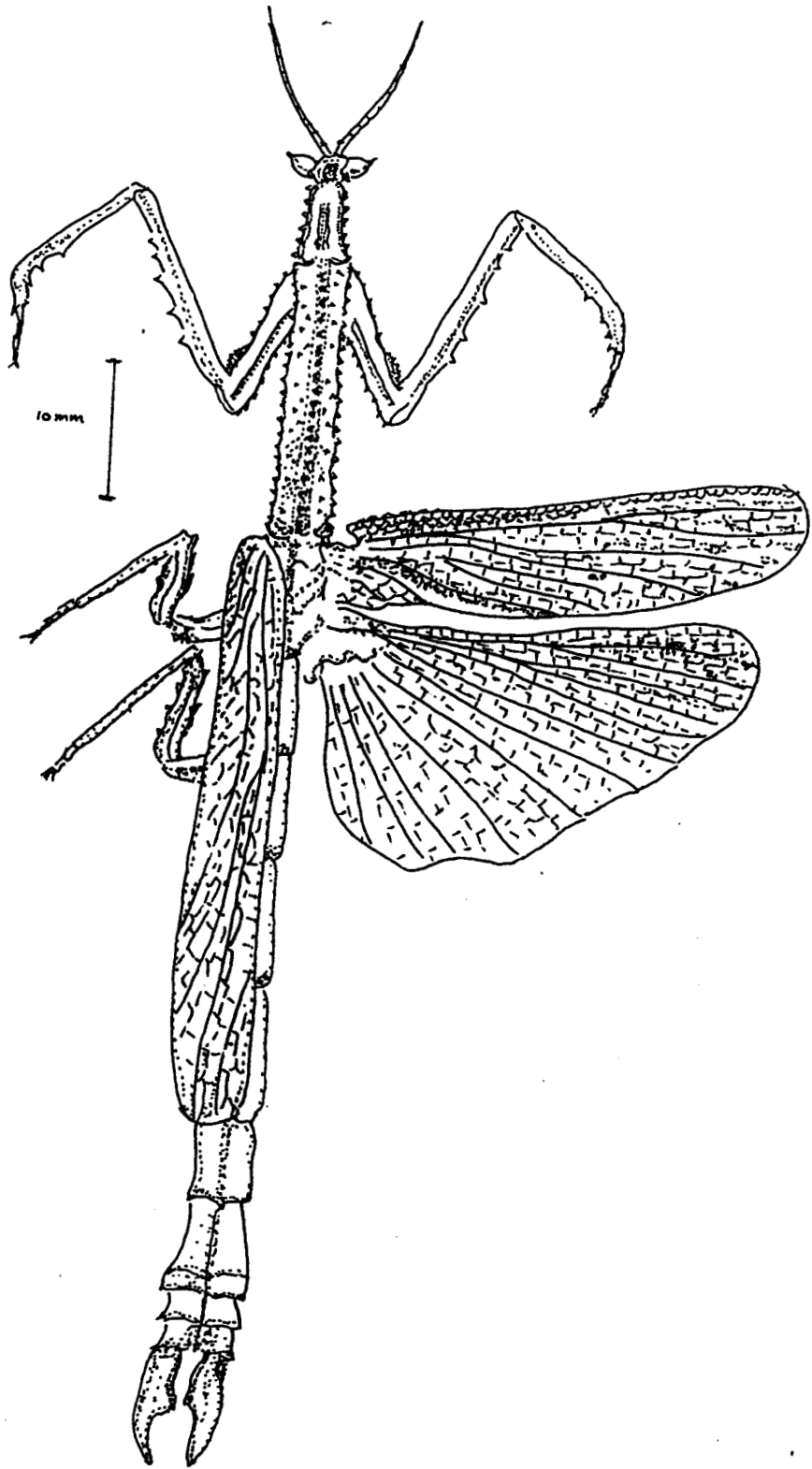
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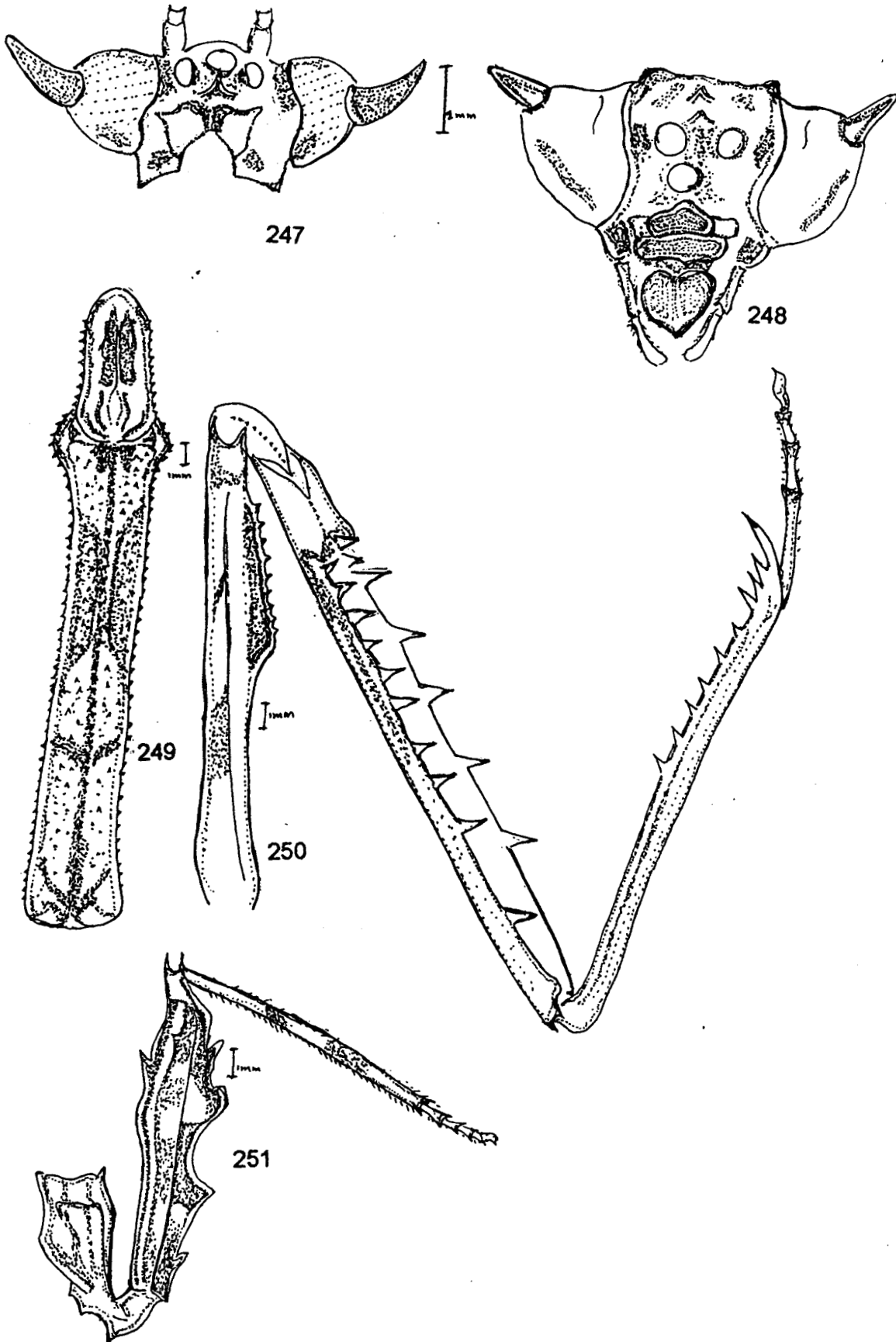
Figs. 240-245. *Cheddikulama straminea* Henry

Fig.240.Head Dorsal view. Fig. 241.Head Ventral view .Fig.242. Mesosoma
 Fig.243.Foreleg. Fig.244.Forefemur front view. Fig.245.Hindleg



246 *Toxoderopsis spinigera* Wood-Mason

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Figs. 247-251. *Toxoderopsis spinigera* Wood-Mason

Fig.247.Head Dorsal view. Fig. 248.Head Ventral view. Fig.249. Mesosoma

Fig.250.Foreleg. Fig.251.Midleg

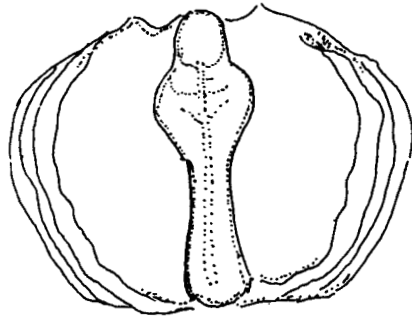


Fig.252. *Choeradodis brunneri* Wood-Mason, Mesosoma.

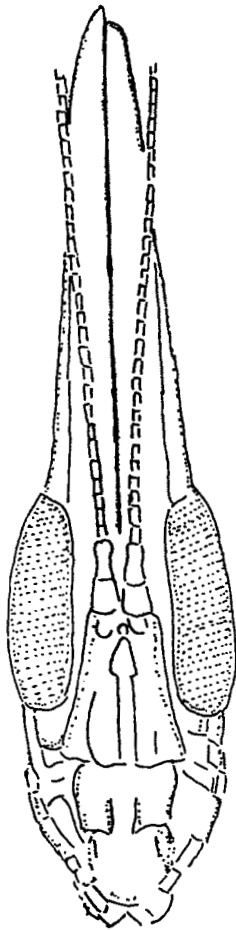


Fig.253. *Didymocorypha ensifera* Wood-Mason, Head Ventral view

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